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Vacation Days.

Now is the time to throw down the tools, whether they be those of the shop or of the office, to forget for a little the hum of the machines, the squeak of the belts, the click of the typewriters, the hello at the 'phone, and to wander whither our tastes may lead, but each as far as possible, if not in measured miles at least in the character of the surroundings, from those of the every-day activities.

We would be glad to think of our individual readers, whom we are wont to see with soiled and busy fingers, with eyes keenly attent, with brains absorbed in mechanical details, as just for a few days forgetting the sight and the sound of the shop, slipping out of the harness and wandering afar, say in the depths of the woods, following cool mountain streams down over the slippery, moss-covered rocks, lazily lying in a boat under the bank where the trees hang over, poling it in among the lilies, or trolling for pickerel with a man to row; working to windward with a breeze that covers the bay with the whitecaps, or running before it in the race for home and dinner, plunging in the surf or digging in the sand; wheeling through the wide farm lands, hearing the bob-o-link as he springs from the fence—the sweetest sound we ever heard, and that was forty years ago—sitting on the piazza of the farm house on the hillside, watching sun and shadow chase each other over the meadow, and the wind rolling the waves through the grain, picking berries and stealing the early harvest apples, getting acquainted with the horses and the cows, the pigs and the chickens, sleeping where the rain beats on the shingles.

For some the greatest change and the best recreation may be in the reverse direction. The steamboat and the railroad train and the crowded city streets may be full of novelty, and be for them most instructive and diverting. New York, whence so many are glad to flee, is the ideal summer resort for many others. To all such, a wide welcome. Let each, wherever he may go, or whatever he may do, make the most of it and get the best out of it, and may each be the gainer, as he should be.

The gain is not alone to the worker, but also to the work. The quality and the quantity of the work turned out for the year are increased rather than diminished by this arrangement for the automatic overhauling of the principal instrument of all accomplishment, the man. We hope to see the day when every humblest worker who toils all the year shall also have in each year his solid week, at least, of play.

We cannot forget the one unpleasant feature of things as they are in this connection. He of the office quite generally gets his week or two weeks of vacation while his pay goes on, but the wages of the worker in the shop stop absolutely, while he must be spending some extra dollars like the rest. We cannot repress the wish that something might be done also for the wage earner. The firms are few as yet who will pay for the vacation days of their men, but we hope that their numbers may increase, or that some arrangement of pay will be made that recognizes the vacation as an incident of the year to be provided for as certainly as the winter's coal.

A Case for Sympathetic Help.

We have received the following letter, which explains itself, and we publish it in the hope that some of our readers will see fit to extend a helping hand where it is needed and where it may do good. The letter is printed verbatim, and we may add that the penmanship is more than good. We shall take pleasure in forwarding any replies that we may receive, and hope that this publication of the letter will not be in vain. A printed form accompanying the letter states that the writer is able to work as an improver or advanced apprentice. The writer's parole takes effect the present month. It will be remembered that the inmates of the reformatory are sent there for their first offense only.

ELMIRA REFORMATORY,
Elmira, N. Y., 6/27/1900.

American Machinist,
218 William St., N. Y. City:

Gentlemen:—Having been a reader of your "American Machinist" for some time I take this privilege of asking your assistance at this time, as I think you may take interest in my behalf and help me. I have been an inmate of this institution for the past fifteen months. During that time I have done my best to atone for the wrong committed, and have therefore been granted a parole. Before I can leave here, however, I must obtain employment. I have had fifteen months experience at lathe, shaper and bench work. I have also a good knowledge of mechanical drawing. I would be willing to start at the bottom of the ladder and work my way up. As it is absolutely necessary for me to have employment before I can leave here, and I have no relatives in New York to help me, I trust you will please consider this application, and assist me if you possibly can. For anything you do for me I will be very grateful, and I am sure I will prove myself worthy of your confidence. I remain yours very respectfully,

X. Y. Z.

The Obligations of Advertisers.

"Editor American Machinist:

"Noticing in your paper several communications 'As to Wages Expected,' 'References Required,' etc., I would, if possible, like to hear from some of your readers their experience before that point had been reached. I refer to the absence of any response to applications in answer to advertisements. Leaving out entirely the question of wages or salary, refer-

ences, general qualifications, etc., I would state that I have within the past two months answered various ads. in your paper, as well as other engineering journals and the dailies, calling for mechanical engineers, draftsmen, superintendents—upwards of seventy in all—and have received one reply; and in that particular case, although prompt to the minute, the advertiser who made the appointment did not materialize, although I waited in his office upwards of one hour. I would also state that I have never received a single reply to eight ads. which I have inserted in various papers. This being the first time that I have ever been compelled to seek employment, it is rather a novel and puzzling experience. INQUISITIVE."

The above letter is deserving of serious and respectful consideration. If it does receive such consideration it may be a surprise to the writer of it, judging by the experience which he narrates. The letter is printed precisely as received. It is correctly written in business English, and the penmanship is good and unusually legible. The writer is a man of average all-around education, to say the least. A considerable number of firms or of business men have by their advertisements asked this man to communicate with them. In offering his services where he has been asked to offer them, he has done an act of business as legitimate as if he had offered to sell a steam engine or a lathe where either of those articles was called for, and he was entitled to be treated with customary business courtesy. We would suggest that the advertisers referred to in the above letter—they know who they are, but we do not—put themselves in the position of this man. Let any one of them try to imagine his replying to seventy different parties who had invited business propositions from him and receiving no reply from any one of them. It is simply inconceivable. Business by correspondence, as most business is now done, could not live a day. Is a man a beggar or something more contemptible that he is not entitled to a reply if his proposition is not acceptable? Are the mutual respect and the much to be desired good feeling between the employing and the employed classes promoted by such contemptuous treatment? Is not even the advertiser's purpose to secure the best skill and the most reliable service necessarily defeated? What self-respecting man could reply to an advertisement if he understood how he was to be treated?

Of course we know how the advertiser for help looks at the matter. He receives many replies—we often receive and forward twenty-five or thirty answers to a single "Help Wanted" advertisement—of which a few are, for one reason or another, more attractive than the others, and he confines his further investigations to those few, ignoring the others. In the end the advertisement accomplishes its purpose, as some one man finds a position, and that is all that is possible in any event; but, remembering the state of anxiety of a man who is looking for work, a postal-card acknowledgement to all would seem to be the least that common courtesy demands.

So far as our correspondent's experience with advertising for a situation is concerned, we think that in these piping times his experience is exceptional. We keep a list of the replies to such advertisements, and an examination of it shows that but few receive no replies, while in many cases they are numerous to a gratifying degree. In general we may say, however, that it is the specialist who is most favored. The toolmaker, the expert operator of some special machine, the draftsman and the pattern maker do not, according to these records, have to wait long for an opening.

The British Admiralty and Belleville Boilers.

We have reason to believe that an important change is impending in the policy of the Admiralty on the boilering of the ships of the Royal Navy. This conversion has been assisted not a little by the record of the "Powerful," which crept home from the Cape at less than half her designed speed, and will now have to be practically eviscerated before she can be re-commissioned for service. If, as we are given to understand, the Admiralty are now convinced that it would be dangerous to rely on this type of boiler in time of war for other than torpedo craft, the naval service will welcome the fact with immense relief. But the change of policy involved will necessarily cause the Lords of the Admiralty to revise the personnel of the consultative engineering branch. Several important changes are, we believe, in contemplation, and with them it may be expected that a reform virtually affecting the efficiency of the fleet will be commenced shortly.—"Pall Mall Gazette."

Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer by mail.

(16) W. S. R., Wilkinsburg, Pa., asks: Why does the shadow of the moon cast on the earth by the sun during an eclipse travel across the earth approximately from west to east instead of from east to west? A.—If you imagine the moon to get into position and then to stand still, the rotation of the earth about its axis would cause the shadow to travel from east to west. On the contrary, if the rotation of the earth on its axis were to stop, the revolution of the moon about the earth would cause the shadow to travel from west to east as it does. With both earth and moon in motion, the movement of the shadow is the resultant of the two, and the effect of the moon's motion predominates over that of the earth, as it is relatively the faster of the two.

Technical Publications.

"Horseless Vehicles, Automobiles, Motor Cycles, Operated by Steam, Hydro-Carbon, Electric and Pneumatic Motors." By Gardner D. Hiscox. New York, Norman W. Henley & Co. 459 pages, 6 x9 inches; 316 illustrations. Price, $3.

The maker of this book has industriously and perseveringly collected an astonishing mass of material from builders' catalogs and the technical publications of the day, so that the possessors of the book who wish to know all that everyone may know about auto- and moto- vehicles up to date will be saved much labor and expense by consulting its pages.

"Gas Engine Construction." By Henry V. A. Parsell, Jr., and Arthur J. Weed. New York, Norman W. Henley & Co. 296 6x9-inch pages; 140 cuts. Price, $2.50.

This book first gives an elementary explanation of how the gas engine works, in the four different types of it, and then proceeds to describe in detail the design and construction of a four-cycle gas engine of ½ horse-power. The first engine from this design was, with the exception of the flywheels and bed-plate, built on a 10-inch Reed bench lathe, having a plain hand slide rest. The book describes in minute detail the building of a similar engine by amateur ways and means throughout; 32 pages, for instance, are devoted to the making of the patterns, and then follows the machining of the parts in detail.

Obituary.

Emile C. Geyelin, an eminent hydraulic engineer, died in Philadelphia June 25, seventy-five years old. Mr. Geyelin was a native of Alsace, France, and studied engineering with Jonval, the inventor of the inverted turbine. He came to the United States in 1849 for the purpose of introducing the Jonval turbine. Later he contributed important improvements to the wheel. Two of his wheels are in the Fairmount waterworks at Philadelphia. He also designed and superintended the construction of turbines used at Niagara Falls.

The following is the essential part of a special news item wired from Chicago to the New York "Times:" "The shaft of one of the big engines which furnish electric power is being lifted 36 inches. With its attachments it weighs 240 tons. With steady pounding of a 74-ton flywheel the pillar blocks became loose and approached each other to the extent of 1-16 inch. This caused the wheel to wobble." The concluding statement is "important if true," which justifies the publication.

Commercial Review.

NEW YORK, FRIDAY EVENING,
June 29, 1900.

ELECTRICAL AND OTHER MACHINERY.

Dynamo and motor trade just now is pretty slim in spite of the fact that the larger factories are still bulging with orders. In New York city it is not much in evidence, and there is an increased willingness to make concessions in price to receive the business that is going. Prices are manifestly softening, although various companies deny the fact on their own part with apparent candor. For the present slackness of business in the electrical and other markets may be adduced a combination of causes, such as a stand-off for lower prices, the approach of the saturation point in buyers' needs, the summer season, the wars and rumors of wars, and the coming election. There is nothing very frightful to business in any of them, nor is there anything very serious in the present condition of trade. The adverse characterization is relative, not absolute.

One of the largest foreign electric installations ever made with American material is said to be on the eve of being contracted for. Mr. Oliver, a government commissioner from Sydney, Australia, where a policy of public ownership of transportation facilities, etc., is pretty extensively in force, is in the United States with a view to ordering the apparatus for a railway, lighting and power plant in Sydney. The system is to be a three-phase one. The value of the installation will be in the neighborhood of $1,000,000. There seems to be every likelihood that the electrical machinery will be ordered in this country, and so far as we know the same is intended for the engines and boilers.

There is an inquiry in the market for three 250-kilowatt street railway generators for a trolley road in Natal, South Africa. A company, which is figuring upon this job, a manufacturer of direct-current apparatus only, is estimating also on five 250-kilowatt machines for a railway in Canada, and on a 225-kilowatt dynamo for a Japanese road. Among street railway business lately closed, the General Electric Company has sold forty-five motor car equipments to the North Jersey Street Railway Company, quite an ordinary sort of event for it. The Bullock Electric Manufacturing Company has on its books a good volume of orders for good-sized street railway generators for the Western States.

The last we heard of the business of the Westinghouse Electric and Manufacturing Company was that they were still active in their works, although there was some quietness noticeable in closing up new work. The company quite recently booked a contract for equipment for the Compagnie Genevoise des Tramways Electrique, Geneva, Switzerland. This will comprise the equipment for 130 cars, it is said, and no doubt the generators are included.

Mr. Campbell Scott, of the C & C Electric Company, has just returned after three weeks in the West, which were partly spent in closing up a motor contract for an electrical transmission plant for a plate glass works at Ottawa, Ill., which will be one of the largest establishments of the kind in the country. The electrical equipment comprised in the present installation will include eight 125 horse-power and eight 150 horse-power motors, a number of smaller ones and a large switchboard. The motors, it is understood, will be driven by two 600-kilowatt Bullock generators, and used for operating grinding and polishing tables. Mr. Scott, comparing Western with Eastern business conditions, is of opinion that in the West—that is, in the region of Chicago—the slump has not been so pronounced as it has here, making allowance for the building trades difficulties in that city. A good order lately booked by his concern, for shipment to London, comprised 100 motors of 5 to 20 horse-power.

In the automobile motor line two contracts have come to notice. The Eddy Electric Manufacturing Company has sold fifty to the Elgin Automobile Company, Elgin, Ill., and the C & C Electric Company is building a lot of special motors for a new automobile concern.

The excellence of trade conditions in Mexico has lately been mentioned in these columns. Boilers of moderate size are among the classes of apparatus in demand there. The problem of transportation is sometimes a difficult one where the installation is to be made in regions unreached by good roads. The New York Safety Steam Power Company to-day received the verbal order for two boilers, of 62 horse-power each, to go to a Mexican sugar and cotton seed oil plantation, where they will be carried on mule back. These boilers, which are Worthington water-tube ones, will have steam drums weighing 1,300 pounds each, yet they will be divided in packages of not more than 500 pounds each. The drums will be cut in three transverse sections, to be jointed and held together by wrought iron rings turned on the inside to make a close fit.

It is reported that measures are being taken having for their object the consolidation of nearly all the electric lighting plants in the Borough of Queens, New York city, into a central station. If this is brought about it will naturally call for a large equipment.

The Cleveland Punch and Shear Works Company, Cleveland, Ohio, are quoting a good many prospective buyers of their tools, and are receiving many new orders for fall delivery. During the past week they have shipped the following tools: A heavy pole cap press for the Milwaukee Iron Wagon Works; a No. 2 metal saw for the Ajax Manufacturing Company; one of their rotary planers, with 16-foot bed and 50-inch cutting head, for the Camden Iron Works; a 12-foot radial wall drill for the Pennsylvania Iron Works; an 18-inch throat punch for the Vulcanus Forging Company, and a 10-foot radial drill for the Oil Well Supply Company.

Senor Ramón Padró y Jové, Calle Yí, Núm 151 A (Correo, Núm 239), Montevideo, Uruguay, an industrial engineer, "with the object of making known in South American countries the progress in sciences, arts and industry," desires to receive catalogs, circulars and price lists of manufactured articles, printed, if possible, in Spanish.

The automobile industry is now beginning to branch out quite extensively in Germany. For about a year there has been a concern at Cologne, the "Maxwerke" Electrizitäts- und Automobile-Gesellschaft, Harff & Schwartz. It is under experienced engineers, has a factory in Köln-Lindenthal, and the electric wagons which it is bringing out are pronounced very successful. The Aachener Stahlwarenfabrik, vorm. Carl Schwanemeyer Aktiengesellschaft, in Aix-la-Chapelle, has undertaken the construction of a motor for automobiles. A permanent automobile exhibition is about to open in Berlin. Applications for space have been so numerous that an enlargement of the original area was necessary.

Consul Worman, in Munich, states that the Bavarian Government has set aside the city ordinance preventing the use of automobiles on the streets of Munich. This opens up one of the best German cities for American manufacturers of horseless vehicles of every sort, and wide-awake agents should be promptly sent to this field, so promising because of the large class of wealthy residents.

Manufacturers of machinery and tools in Germany are lying awake nights worrying over American competition and seeking to devise schemes that will overcome it. Their cogitations seem to be unusually active just now. A number of manufacturers in the Rhenish-Westphalian district have united in a league with the avowed object of withstanding foreign competition, especially from America, and averting the damage threatened to home industry. This union is not intended to be monopolistic in character. The classes of products represented in the manufactures of its present constituency include edge and other hand tools, files, rasps, saws, axes, machine knives, padlocks and other hardware. The membership is increasing.

Acting Consul Monaghan has reported from Chemnitz that, according to several newspapers in Milan, the Italian Minister of Railroads has empowered the Italian Meridional, Mediterranean and Sicilian railroads to call for bids for 123 locomotives, 460 baggage cars and 2,673 freight cars, valued at $8,878,000. For the construction of these, competition is open to the world.

There are two railways running from Athens, Greece, to the Piræus which will probably adopt electric power in a short time. One is the Athens & Piræus Railway Company's, which, according to the terms of its franchise, must do so in the next three years, and the other is a Belgian company's. The president of the former has gone to the Paris Exposition to study up electrical apparatus. A concern in Athens is trying to secure the contracts for the equipments of these roads. Consul McGinley transmits this information with the apparent intention that American manufacturers shall not lose a chance to bid.

Export tables show that from 1895 to 1898 imports of American industrial products in South Africa were on the increase, while those of Germany were falling off. This growth in American trade was fostered by conditions of production favorable thereto, and by some 20 per cent. advantage in freights as compared with the rate from Germany. The Germans hope that with the present prices of material in South Africa they may regain some of the ground they have lost. But in view of existing tendencies of the American iron market and its ramifications, it looks as if we shall hereafter hold a distinctly superior hand in the matter of prices, as we did two years ago.

MACHINERY AND TOOLS IN THE CAUCASUS.

Consul Schumann sends the following from Mainz: "French and Belgian capital is largely interested in industrial undertakings in the Caucasus. In 1898 the export of manganese iron ore from the Caucasus amounted to 20,000,000 poods (361,120 tons), and recently a number of new mining concessions have been granted. The most important of the new French companies, whose chief industry is the mining of manganese and copper ore, is the "Société Industrielle du Caucase," whose main offices are at Tiflis. The demand for mining machinery, tools, and instruments of all kinds is very great."

PITTSBURGH REPORT.

The situation in the iron and steel trades is quite an interesting one at the present time. The markets have dropped back into a condition which might have been expected, but was not. Only a few saw the impending danger which hung over the general line of trade in iron and steel, and the coming condition is but the result of the steel and wire panic of a few weeks ago. The announcement that producers of raw material have decided to return to the lowest possible basis of prices in order that a restoration of business activity may result was not wholly unexpected, and it is now come to the point where it looks as if bed rock prices will again prevail, and that there will be a return of the old low rates.

To use the expression of the office boy, "There ain't no market," which would be hitting the nail on the head, if his grammar were a little better. There is no demand whatever, and this is the cause for the slump. Buyers will not buy, and the only thing to do is to go back to the old prices and build up again. If the readjustment of prices had only been done last winter, at the time it should have been done, the iron and steel market would have been in a flourishing condition today, instead of being listless. Rumors are current at this writing that billets are being quoted at $24, and that Bessemer iron can be had for $15. This is a heavy drop. There will be a demand as soon as rates are adjusted, and this demand will restore activity.

The season for making repairs is now on, and many of the blast furnaces throughout this and other districts are being closed down preparatory to a relining and remodeling of working machinery. The supply men are busily employed, and in several cases are running day and night.

The Duquesne Steel Foundry Company is making rapid progress in the construction of its new plant at Coraopolis. The roof and sidings are well up, and it will not be long before the installation of machinery will be made. The Pennsylvania Engineering Works, at New Castle, are adding a new building to the plant, and expect to have it completed within a short time. The Monongahela Machine Tool Company, of this city, is furnishing quite a number of machine tools to concerns in the Pittsburgh district. Two large lathes were recently sold the Duquesne Forge Company, at Rankin Station, near Braddock, and a 10-ton traveling crane of the Northern type to the Fort Pitt Bridge Works, Canonsburg.

The combination of tool steel manufacturers will probably be effected in a short time. Most of the Pittsburgh concerns are interested in the proposed organization.

CINCINNATI REPORT.

A glimpse at the local situation with reference to demand and output of machinery and machine tools suggests a waiting policy among the larger interests that has extended its influence throughout this territory pretty generally. A consensus of opinion from a number of the largest local manufacturers indicates that when the adjustment of value occurs in coarser metals there will be a revived condition of buying throughout the line. The largest concerns still claim a fair amount of business ahead, with inquiries very satisfactory, conceding at the same time that there is not the urgent demand for goods that existed six or eight months back. The Cincinnati Tool Company, makers of the smaller lines of tools, says the condition of the market with them is satisfactory. Its output for the year ending June 30 was considerably ahead of that for the corresponding period in any other previous year in its history, and although the domestic demand is not equal to that of last year, they look forward to a good summer and fall business. President August H. Tuechter, of the Cincinnati Machine Tool Company, has just returned from an extended trip in New York and the East. He reports his concern quite busy, mostly on old orders, however, new business not having been placed so rapidly during the last four or five weeks. Mr. Tuechter is optimistic on future conditions, and believes the recent labor trouble has not affected them in any way. Orders on hand at the Cincinnati Machine Tool Company are enough to run them into the fall months.

Turning to the wage situation and its possible effect on the market and output, there is anticipated some trouble from the foundries on July 1. This is the date set by the molders on which they expect a restoration of their old scale. If it is not done they will declare a strike. There is considerable investigation and some buying on the part of foreigners and others interested in mining machinery. The end of the war in South Africa has given the operations in that quarter of the globe an impetus which will see its effect in a largely increased demand for this class of machinery, and that in turn is expected to materially assist other lines of machinery making having a bearing on this industry. There appears to be a good demand for electric power machinery. Those local concerns which deal in this commodity pronounce conditions first-class. The Bullock Electric Manufacturing Company has an order from the Cincinnati Edison Company for two motor generator sets; from the Norfolk Navy Yard an order for a 125 horse-power motor, belt type; from the American Thread Company, Holyoke, Mass., for a 100-kilowatt generator, and from the Dayton Electric Light Company, at Dayton, Ohio, for three series arc light generators of 150 kilowatts each.

Quotations.

NEW YORK, Saturday, June 30, 1900.

Iron—American Pig, tidewater delivery:—

Pennsylvania Irons:	
No. 1 X foundry	$18 50 @ $19 50
No. 2 X foundry	17 50 @ 18 50
No. 2 plain	16 50 @ 17 50
Alabama Irons:	
No. 1 foundry	20 25 @ 20 75
No. 2 foundry	19 50 @ 20 00
No. 3 foundry	18 50 @ 19 00
No. 1 soft	20 25 @ 20 75
No. 2 soft	19 50 @ 20 00
Foundry forge	17 50 @ 18 00

Bar Iron—Base sizes—The price on dock is 1.60 @ 1.70c. for good refined brands, and 2.05 @ 2.15c. upward for same from store.

Tool Steel—Base sizes—Good standard quality, 7 @ 8c.; extra grades, 10 @ 14c.; special grades, 16c. and upward.

Machinery Steel—Base sizes—From store, 2.30 @ 2.40c.

Cold Rolled Steel Shafting—Base sizes—From store, 3½ @ 3¾c.

The Paris Exposition—VI.

EDITORIAL CORRESPONDENCE.

The judges of machinery have been appointed and something begins to be known of their methods. It is said that the length of time that a builder has been in business will cut an important figure in the awards, and that so far as the machines themselves are concerned relatively little attention will be bestowed upon them. Some of the tool builders are thinking of filling out their blanks with the date of the beginning of their apprenticeship as the date of their establishment, and some of them may possibly go as far as a jobbing and contracting carpenter in East Orange. He found that his being new in the business handicapped him somewhat, and so he put up a sign over his shop, "Established 1854." That was the date of his birth, and its effect, he declares, has been good.

Americans are not in the habit of regularly judging tools by the length of time the builder thereof has been in business, and I suppose the influence of the American members of the juries will be against this practice here; but the American members are naturally in a small minority of the whole. Some of the poorest tools shown here—tools that not only have no good points of design, but that have their flat, sliding surfaces finished by filing and the liberal application of emery paper, are under signs stating that the builders were "Fondée en 18—;" the last two figures of the date being so small as to be of no consequence. If that exhibitor gets an award based upon the quality of his tools, it will be an essentially different award from what it will be if based upon the fact that he was "founded in 18—." This would be a more serious matter to machinery builders, perhaps, if any of them were in these days inclined to attach any importance whatever to awards or medals obtained at exhibitions.

Speaking of the finish on machine tools reminds me that there is in the French section a boring and turning mill of about 10 feet swing and with uprights proportioned as American ones were wont to be in the early seventies. The crossrail of this mill had been ornamented by scraping square spots upon it in regular patterns, but without reference to the production of a surface. One day a French workman put up a staging to enable him to reach this crossrail—for some inscrutable reason preferring this to lowering the crossrail—and, with a block of wood and emery paper, he rubbed all this checkered scraping off. I supposed that meant that they had concluded not to have a scraped crossrail. But the next day another man occupied the staging and was putting the scraping back. I don't know whether this meant so many changes of mind or whether the first job of scraping was not considered sufficiently artistic. Without pretending to be a judge of ornamental scraping, I nevertheless cannot see that the second job is a very decided improvement over the first, so far as appearances go, and am quite certain that the surfaces are no nearer true planes than before. We had best draw a veil over the experience of a man who has to scrape an extensive cast iron surface that has previously been thoroughly rubbed full of emery.

A FRENCH TRAVERSING MACHINE.

There is another tool in the French section that ought to interest Prof. Sweet. It is a copy of his traversing machine, but not a very close copy—in fact, with some of his leading features left out; with the idea, probably, of making the machine better. It is a large machine—2 meters, or about 6½ feet, between the housings and about the same under the crossrail. Instead of the table being guided laterally by one side only, it is gibbed over the entire bed from outside to outside; but, what is far worse than this, the crossrail is fitted to the uprights in the same manner, *i. e.*, dovetailed over the outside edge only of each upright, so that when feeding vertically, for instance, as in boring or drilling, when the clamping bolts must be loose, the accurate maintenance of the crossrail in its position depends upon two beveled surfaces which are about 18 or 20 inches long (no longer than the width of the crossrail), and about 8 feet apart, to say nothing of the fact that resistance to displacement can be afforded only by the lateral stiffness of the uprights, which, of course, cannot be much. One is compelled to stand in awe of the boldness (and other qualities) of a man who will build a machine as large as this and set it up in a world's exposition to be seen of all men, without having at command even an elementary knowledge of machine tool design. If he had made a square gibbed surface at the outside of his uprights it would not have been quite so bad; but as it is, it could not possibly be worse, and I wonder what kind of an award he will get. I did not notice in what year he was "fondée."

I know perfectly well that Prof. Sweet will say that I ought to put in my time hunting up and telling about the good and instructive things in the French tool exhibits, instead of finding things to criticise and ridicule, and I hasten to explain that I have been hunting such things and have found a few which I hope to be able to give some account of later, but I find it difficult to get hold of them. Some of the exhibitors pay no attention to my request for what assistance and co-operation I need, and it is not practicable to get satisfactory photos of tools at the Champ de Mars; first, because the tools there are not favorably located for photographing, and second, because a fee of 25 francs, or $5, for one short forenoon's work with a tripod camera is imposed, in addition to a lot of red tape; so that I prefer to pursue other methods.

SOME LATHE PROPORTIONS.

In the meantime let us glance for a moment at the proportions of a lathe not far from the traversing machine, and which attracted my attention so that I made a few measurements of it. It is 60-inch swing; the bed is 36½ inches wide over all, and the footstock is 21 inches wide at the bottom. At Fig. 21 is a diagram which represents to scale these proportions; the inner or smaller triangle representing the footstock hight and width. Of course, the lathe will not turn 60 inches diameter over the carriage, but it will turn large enough to make the rest entirely overhang the bed in front, which, in fact, it actually does in the exposition. There is a gap which swings, I do not know how much more, for there is a special rest supported upon an extension of the bed. There is a smaller lathe, which I did not measure, but in which I think the triangles would have still shorter bases in proportion to their hight.

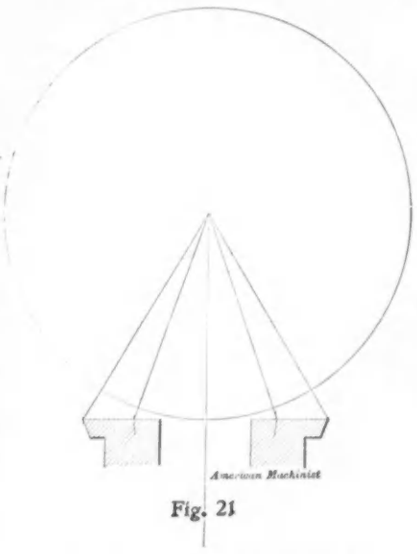


Fig. 21

SOME LATHE PROPORTIONS AT PARIS.

And these are lathes exhibited at this *fin de siecle* exposition, which is supposed to represent the world's attainments to date.

AN AMERICAN BORING AND TURNING MILL'S PERFORMANCE.

A machine tool which is prominently located at Vincennes and which for other reasons as well, is likely to attract attention is shown at Fig. 22. It is a Bullard 62-inch boring and turning mill, and there is an interesting story connected with it. A mechanical officer of a prominent Continental railway wanted a machine for boring, or perhaps it would be better to say turning, the interior surface of steel tires for car wheels. He made some preliminary investigation, which resulted in his sending several of the tires to the Bullard space at Vincennes to be turned as a test of the machine.

Such tires are now being bored in the

shops of the railway in question upon an old and somewhat decrepit mill; and to see it in operation one would think that the metal of the tires was about as hard as any metal could possibly be and yet be workable at all. The cut surface shines, the tool soon dulls, the machine strains and shows evidence of distress, and altogether it is a hard job. When the tires were delivered at Vincennes it was stated that if one of them was bored in an acceptable manner within an hour it would be considered an entirely satisfactory performance.

The old machine does two per day.

The best tools were not readily obtainable here for the work, and the tire could not, with available appliances, be placed as close to the table as it would be when fixed for regular work. But the first tire was bored under these adverse conditions in 15 minutes, and Mr. Payson Bullard, who is in charge of the exhibit, not being satisfied with this four-times-as-fast-as-desired performance, got some better tools and did subsequent tires in 10 minutes, remarking, when counseled to leave well enough alone: "If a competitor is after this order and proposes to show what time he can turn these tires in, I propose to give him something to do." And what appeared perhaps the most astonishing feature of the whole performance, though readily understandable by those experienced in such matters, was that these tires when put on to this heavy and rigid machine, seemed like a different article altogether; they seemed only moderately hard, and some of them even soft, though driven at a higher speed, and the cutting tools stood much better. It is simply the old truth that chattering and vibration pound the edge off of cutting tools, and that they therefore do better in proportion to the absence of vibration and chatter.

I need not describe the mill in detail, especially as it is so well shown by the photo, but there is an entirely independent feed motion for each saddle, with feeds ranging from 3-64 to ¾ inch horizontally and from 1-40 to ⅜ inch vertically or at angles. Work up to 62 inches in diameter and 42 inches high can be turned, and there are sixteen rates of speed for the table. The machine weighs 20,000 pounds. Various other sizes of mills are shown, but I select this particular one for illustration because it is the one that turned the tires.

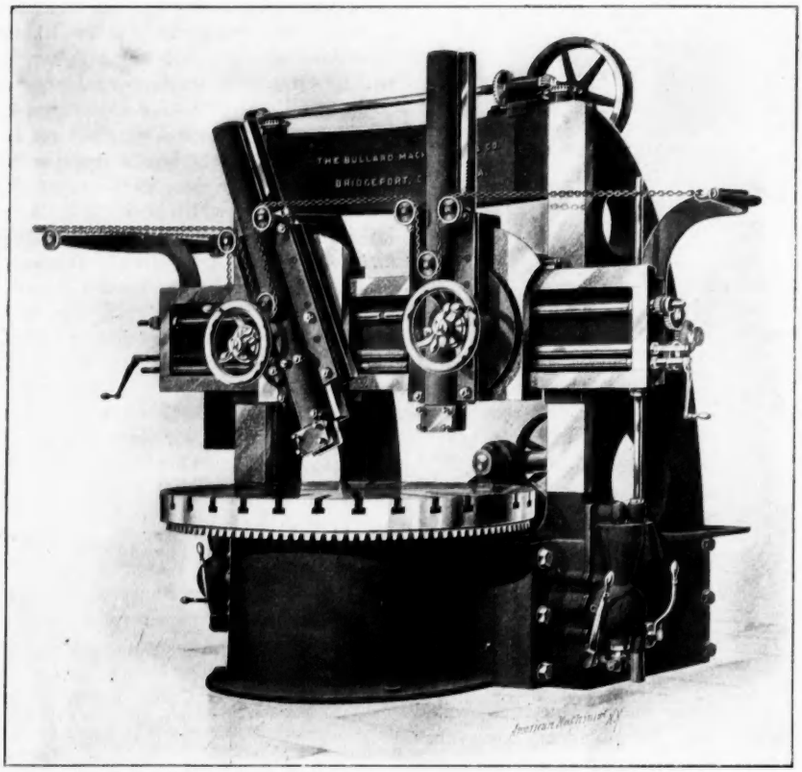


FIG. 22. BULLARD 62-INCH BORING AND TURNING MILL EXHIBITED AT PARIS.

Another machine shown by Bullard is represented by Fig. 23. This is called a combination turret machine. It is 22 inches swing, and has a bed 8½ feet long. One of the principal features of the machine is in the headstock, which is so arranged that by moving levers three different speeds are obtained without shifting the cone belt or stopping the machine, in addition to which there are two forward speeds to the countershaft. In the headstock there is the now common double-friction clutch for throwing the back gears in or out, and there is also a faceplate drive. The pinion that drives the faceplate gear is solid with the shaft which passes through the bearing, and is splined into the back-gear quill, so that it can slide forward or back into or out of engagement with the faceplate gear. This motion is given to it by means of the lever seen pivoted below the bearing, which works a pinion engaging with rack teeth cut on a sleeve which forms the bearing for the shaft and which is somewhat larger outside than the outside diameter of the pinion. When the lever is moved back it draws the pinion out of the gear and carries it inside of the bearing; or rather, inside of the boss of the arm which supports the bearing, the shaft telescoping within the quill. When the pinion is about ⅛ inch from the gear a clutch formed at the other end of the sliding bearing engages the other pinion, and thus the ordinary back gear. It is found by experience that changes can be made from one to the other without the necessity for stopping the machine. It will be noted that the lead screw and feed rod are driven by independent trains of gearing; that all feeds are positive, and

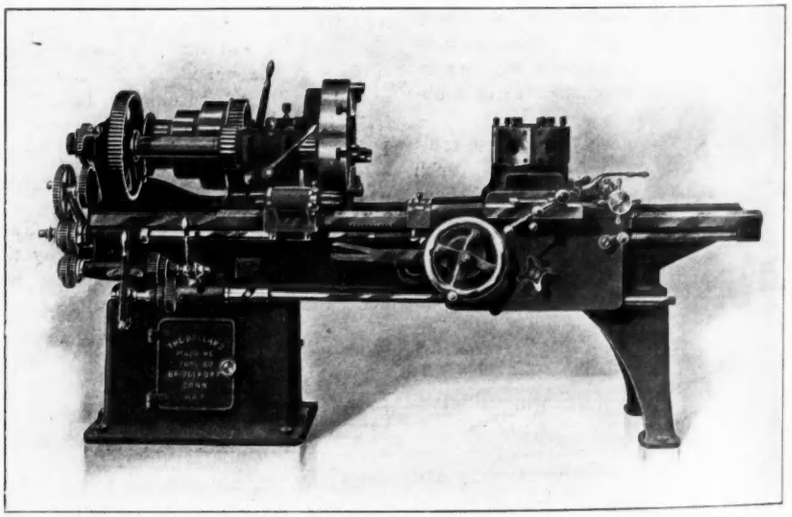


FIG. 23. BULLARD COMBINATION TURRET MACHINE SHOWN AT PARIS.

that there are revolving independently-adjustable stops for the carriage and cross feeds. For the carriage feed there is also an automatic release, which is provided for by making a beveled surface near the end of each stop bar, which beveled surface depresses a pin seen passing down through the upper left-hand portion of the carriage and resting upon the feed trip-lever. After release further motion can be given to the carriage by hand to bring it up to a positive stop, or the stop-piece or abutment on the carriage can be shifted out of the way to run by it when desired. This machine also is belted up, and is shown to be capable of taking some astonishing cuts.

A GERMAN VERTICAL MILLER.

It will be recalled that in our issue of March 9, 1899, we published an illustrated description of a very large horizontal boring machine built by Droop & Rein, of Bielefeld, Germany. They have an exhibit in the Champ de Mars, which shows what there is other evidence for believing, *i. e.*, that they are among the wideawake and progressive concerns of their country.

At Fig. 24 is shown a vertical milling machine exhibited by them. The motor drives, by a small, high-speed belt and encased reducing gears, the belt pulley seen at the base of the machine, and from this a belt passes over the usual idlers to the drum which is provided to permit vertical motion of the spindle. There is a sliding head for the spindle, which carries both spindle bearings. The back gears are on the spindle, and there is a ball-thrust bearing for the latter. The platen is fed upon the knee or through the saddle automatically, and with adjustable automatic release in either direction, and there is also an automatic circular feed for the table, the worm for which can be disengaged from the table when desired in centering or otherwise setting work. The circular table is readily removed when not wanted, and when that is done the hight from the top of the knee to the working surface is not so excessive.

A DOUBLE-SPINDLE GERMAN MILLER.

At Fig. 25 is a double-spindle machine, also exhibited. The spindles are driven by worm gearing, the end thrust of which is taken by hardened rings and balls. The worm shaft is driven directly by a belt with suitable take-up, and the table is fed by spiral gear and rack at eight different rates in either direction, with automatic release.

A GERMAN SLOTTER.

Fig. 26 is a motor-driven slotter shown by the same builders, and which they are particular to state is useful for very many other things besides slotting, and that they have been building similar machines for ten years. The ram of the machine has a stroke of 40 inches and is actuated by a screw. The housing of the motor is a part of the bed of the machine. One end of the motor shaft carries two pulleys for the open and crossed belts for driving the machine, while the other carries a pulley, from which motion is derived for quickly moving the table in either direction. The stroke is reversed by the two dogs seen in the circular slot of a disk, which is part of the driving mechanism, and the stroke can also be arrested or reversed by the hand lever.

SOME NEW CENTERING TOOLS.

These people also exhibit a centering machine and some small tools that are of interest. At Fig. 27 are shown the tools used in their system of centering. There are three pieces that go to make up the centering tool, and these are shown separately and together, ready for use, with, also, the end of a piece of centered work. First, there is the centering drill, which is like the drill known in America as the Farmer drill, but it has four grooves, the two extra ones being small and made in the middle of the "land." These two small grooves are used to drive the drill by, and it is thus seen to be driven its full length and close to the point. The driver for the centering drill is also the center reamer, which is two-lipped, as shown, and has a hole passing entirely through it. The inner edges of the two sides forming the grooves and lips fit into and hold and drive by the grooves in the small center drill. Outside of the center reamer again is the similarly formed facing cutter which trues the end of the work about the center hole.

A NEW FACE MILLING MACHINE.

This firm exhibits also the face milling cutter shown by Fig. 28. The cutter proper consists of a flat bar of steel bent to form a ring, turned, bored and cut with teeth, which are relieved as shown, so that they can be ground on their radial faces. This ring is secured in the holder by a conical plug and nut, as shown. They are made in any desired size, and are declared by the makers to be much superior to those cutters which have each tooth a separate piece of steel.

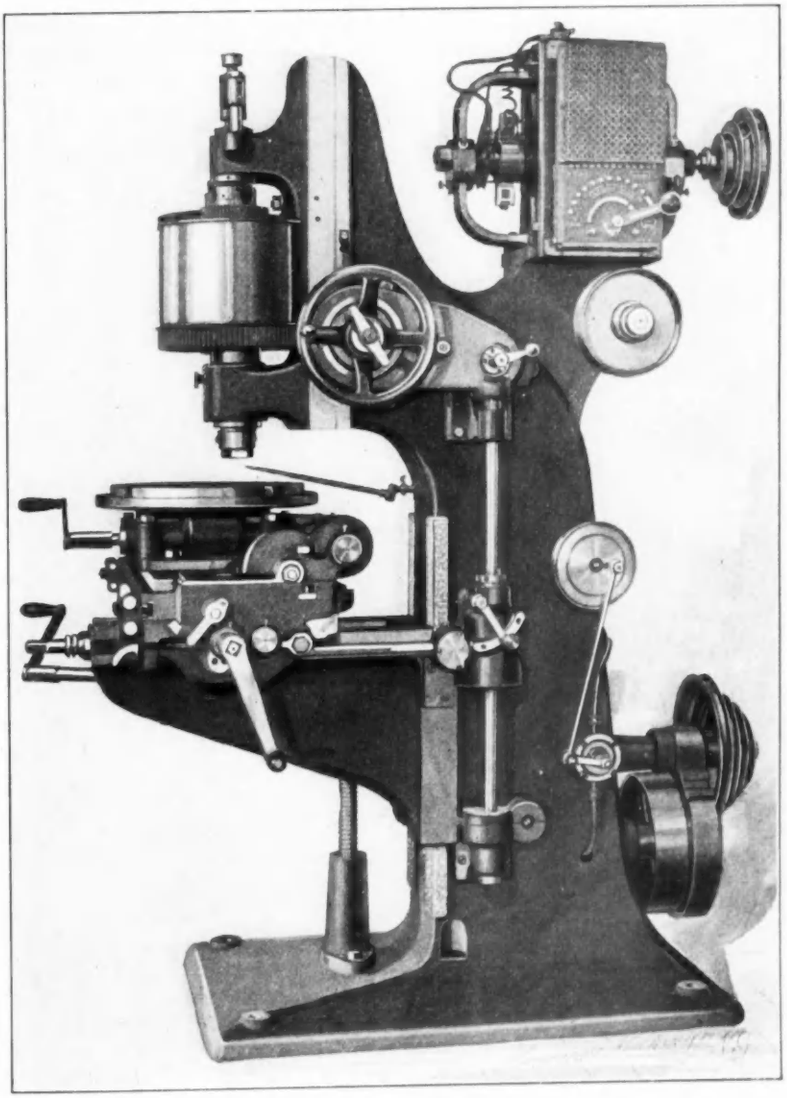


FIG. 24. VERTICAL SPINDLE MILLER, EXHIBITED BY DROOP & REIN.

TRANSPORTATION TO VINCENNES.

Facilities for traveling between the Champ de Mars and Vincennes are being

increased, and the quickest route now available is by the Ceinture or belt railway, which passes around Paris just inside the line of fortifications. A station of this railway has been established just west of the Eiffel tower, and another one very near the locomotive exhibit at Vincennes, and the trip can be made by this route in half an hour.

The trip by the river is more comfortable than formerly, because one can now disembark from the boat at Pont Nationale, which is where the fortifications intersect the river on the east side of the city, and from there go by a newly opened trolley line to the entrance gates very near the Vincennes locomotive exhibit. We have not yet seen the promised express boats, but perhaps they will be put on in due time, whatever time that may be.

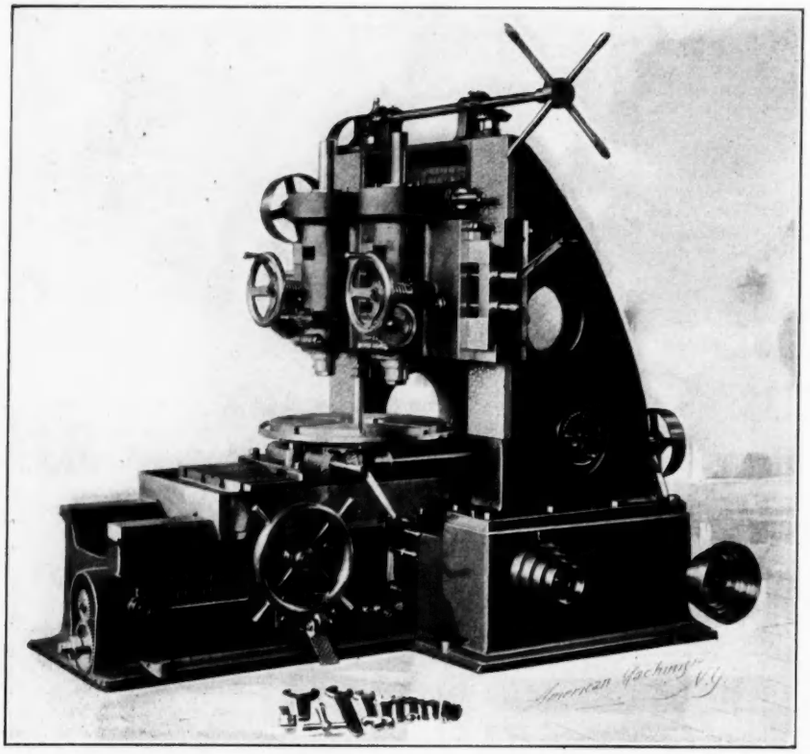


FIG. 25. DOUBLE SPINDLE MILLER, EXHIBITED BY DROOP & REIN.

PROBABLE SUCCESS OF THE VINCENNES MACHINERY EXHIBIT.

Independently of the fact that it is always more pleasant to have one's own predictions come true than to have them fail, it is, for much more important reasons, gratifying to be able to say that the tool exhibitors generally at Vincennes are now feeling as though the enterprise is almost sure to be successful and to repay them for their trouble and expense. While the total number of visitors to the machinery building is not imposing, viewed simply as a number, a very large proportion of those who have gone there have done so with a definite purpose in view, *i. e.*, to see what the Americans have to show that is new. Several of the exhibitors keep visitors' registry books, and the names, addresses and occupations or titles of those who record themselves show that a good many men are already coming from all parts of the world for serious purposes. Some of them state that they have been sent on in advance to look over the exhibited machinery and to select and designate to their superiors the machines that are best worth seeing, or which are of special interest to the establishment, it being the intention of the said superiors to visit the exposition later in the season, when at the same time they can see all the other features that may interest them. The American machinery exhibit at Vincennes is now practically complete and in running order, but the American machinery space at the Champ de Mars (if a spot of such exceedingly limited area can properly be called a space) is not so well advanced, but will probably be complete within a few days. It was officially opened on June 6, the ceremonies consisting of little more than an inspection by Commissioner-General Peck, except that on the gallery where is located what is called the "Retrospective and Collective Exhibit" there was some speech making, and Mr. J. S. Anthony, assistant director, who has special charge of the department, gave a description of some of the most interesting of the pioneer and now historical electrical apparatus, etc. He told me in the morning, when he was trying to get the space ready for the ceremonies, that the placards that had been made to go upon the different exhibits probably could not be put on in time, because the man who had made them was so hopelessly drunk that he was unable to even tell anyone where the completed or partially completed ones were. We are constantly told in America of some evils that we suffer from that do not exist in France, but which nevertheless do exist here; one of them is drunkenness. Another is—"but that is another story."

NOISY EXHIBITS.

This is the first general exposition in which air driven tools have been shown to any great extent. They constitute a very interesting and instructive feature of the Vincennes exhibit, and give one a very vivid idea of the wonderful increase of efficiency of labor secured by their use as compared with the methods previously followed. Exhibitors of other tools and machinery at Vincennes are very heartily wishing, however, that these air tools had been installed in a separate room, for it cannot be denied that they are frightfully noisy, and it is decidedly annoying when one is in the midst of a quiet conversation with a visitor or possible customer to be interrupted by this deafening, all-pervading and overwhelming noise, and to either be compelled to stop or raise one's voice to a painful shout in order to be heard at all. Much the same objection applies, although perhaps not quite to the same degree, to certain wood-working machinery, and Warner & Swasey have a similar trouble to contend with in their space at the Champ de Mars, where the instruments of precision are exhibited. Here they have one of their latest equatorial telescopes, a chronograph, and several other instruments of a very refined character, together with a spectroscope, and a number of other things made by John Brashear. Somehow it seems utterly incongruous to explain or discuss the exquisite refinements of a delicate piece of astronomical apparatus in a throat-splitting shout, as though one were chief of a village fire brigade in full action, and that is just what they are obliged to do, on account of the fact that just across a narrow aisle from them is a phonograph exhibit, and the exhibitor puts a 6-foot brass horn on to one of his 40 mule-power phonographs, turns the horn towards the astronomical instruments and "cuts her loose" on the latest variety show song, which after, say, a hundred or so repetitions becomes, with its brass accent, simply maddening. There are certain exhibits whose proper function it is to make noise; they are all right in themselves, but should, so far as possible, be located so as not to interfere with other exhibitors, to whom such noises are not only a nuisance, but a positive detriment and injury.

AN EXHIBIT OF FAST-CUTTING STEEL.

The Bethlehem Steel Company is installing at Vincennes a large lathe with separate driving arrangements, in which lathe they propose to turn steel forgings and other pieces at unprecedented rates of speed by using tools made of ordinary

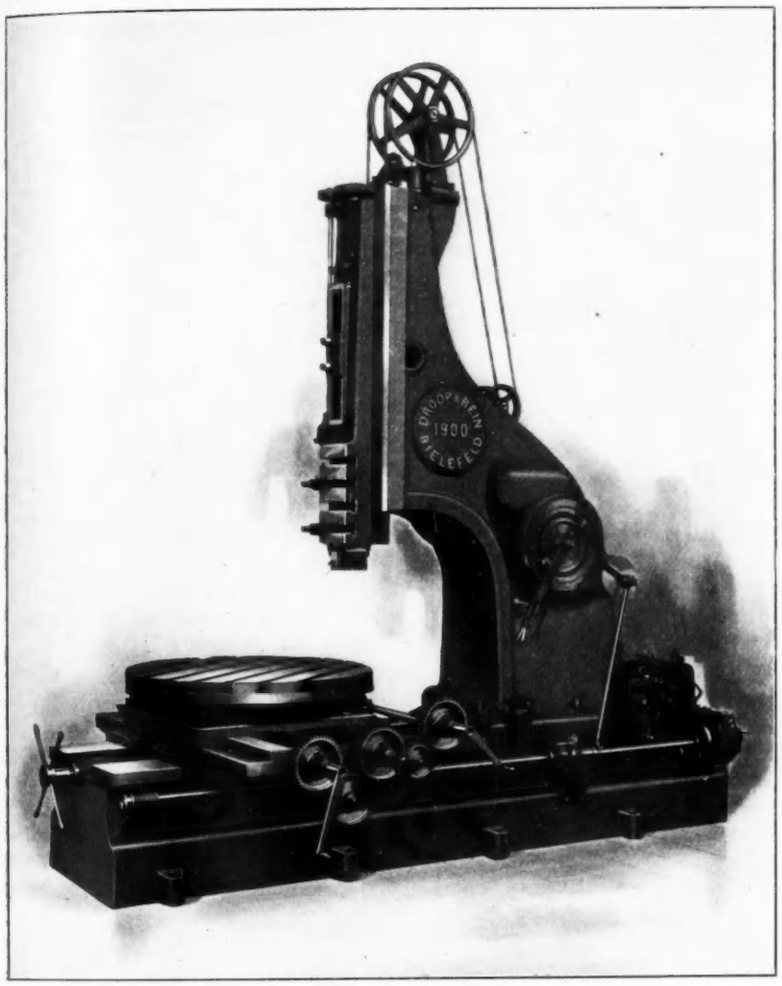


FIG. 26. MOTOR-DRIVEN SLOTTING MACHINE EXHIBITED BY DROOP & REIN.

grades of carbon steel, which tools have been treated by a special process perfected at their works at South Bethlehem, the invention, I think, of Fred W. Taylor. The exhibit comes as something in the nature of an afterthought, and was not at first expected to be here, so that naturally some special effort was made to rush it through. The exhibit was loaded on to three freight cars at South Bethlehem and taken to New York in one night. Arrived at Havre it took ten French freight cars to carry it, and it took these cars eight days to reach Paris, the difference in extent of the two railroad journeys not being important either way probably.

The process referred to seems to give promise of exerting an important influence on rates of machine shop production. I am informed that, taking a cut 3-16 inch deep with 1-16 inch feed on a mild steel forging, a tool that has been treated by this process will regularly stand a speed of 120 feet per minute, which is at least six times as fast as the ordinary tool will stand. It is easy to see that if there are no disadvantages to offset this, it means very much to machine shops; much increased capacity of all machine tools, especially heavy ones, and such changes in the design as will enable the increased driving power to be applied to them.

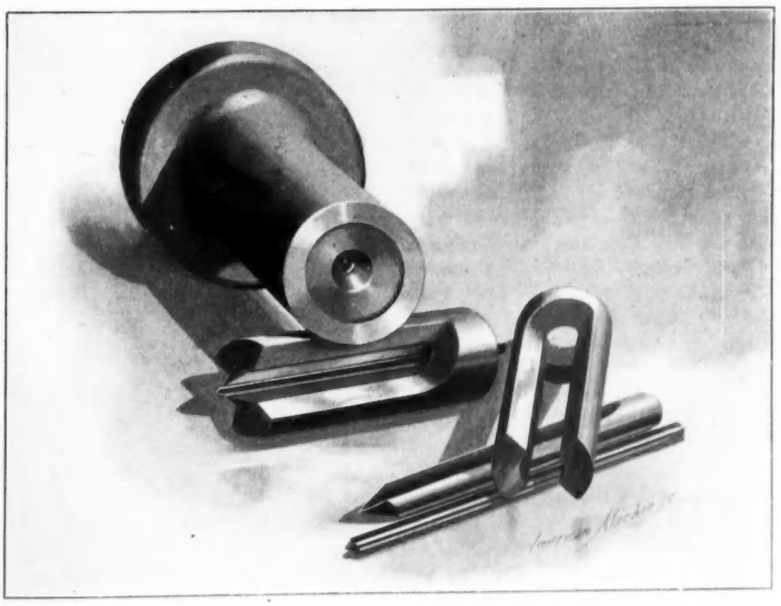


FIG. 27. CENTERING TOOLS SHOWN BY DROOP & REIN.

A BREAKDOWN.

At this writing the machinery at Vincennes is again non-operative, because yesterday the Willans engine that has been doing temporary duty as a prime mover there, broke a piston and had to shut down. Mr. Anthony, in order to get going again as soon as possible, took the night train for London, and will, as soon as possible, bring back with him a new one from the builders at Rugby, the idea being to save the truly awful lot of time that would certainly be consumed in getting it here if it came through the ordinary channels, including the regular custom house. This is a case wherein the oft-referred-to interchangeable system of the Willans & Robinson Company will be tested, and is expected to prove of great value.

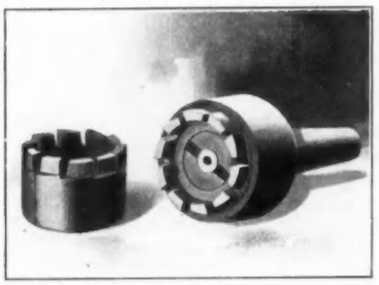


FIG. 28. NEW FORM OF MILLING CUTTER SHOWN BY DROOP & REIN.

Paris, June 8. F. J. M.

Recently in demolishing a forty-eight-year-old vault in the Wall street section of this city, a large number of eight-pound iron balls were found. They were in the joints of the granite slabs which formed the outer wall, one-half of each ball being let into the edge of a slab and the other half into another, thus locking them together for the discouragement of burglars. Dynamite would, of course, laugh at the contrivance.

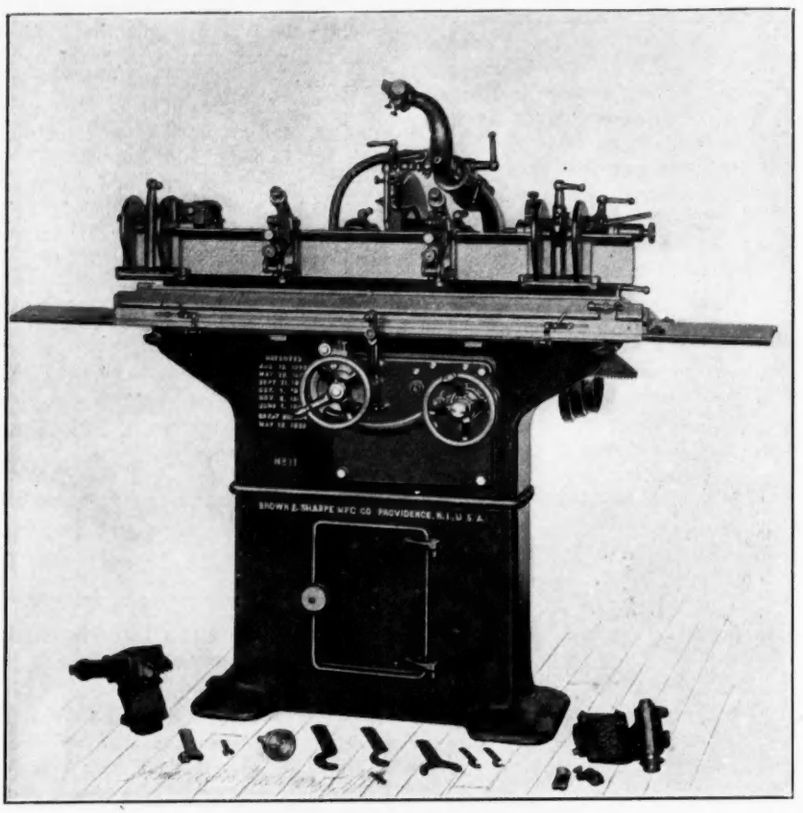


FIG. 1. FRONT OF PLAIN GRINDING MACHINE.

New Plain Grinding Machines.

All readers of the "American Machinist" have known of, and very many have been familiar with the Universal grinding machine as made by the Brown & Sharpe Manufacturing Company, the original invention having been made nearly thirty years ago by the late Joseph R. Brown, of that firm. These machines were first introduced as a convenient means of obtaining accuracy, and for many years they were used for little else than hardened work. Experience has shown, however, that accuracy is not the only advantage of this system of grinding. Since the introduction of accurate grinding, there have been great improvements in machines, wheels and methods for grinding rapidly, until accuracy has come to be considered simply as incidental to the process, and the sizing of work is now accomplished in a shorter time than with the lathe and file. Especially is this true of "manufacturing grinding," as distinguished from "universal grinding."

In order to provide machines for "manufacturing grinding," the Brown & Sharpe Manufacturing Company have brought out those here shown. The design embodies the experience of many years in both the manufacture and the use of grinding machines, and it is intended to enable an operator (who may not be a mechanic) to size the common product of the engine lathe after it is turned roughly to the approximate diameter, and to do this sizing in much shorter time than is possible by the older method, at the same time producing more accurate work than can be done by the most skilled mechanic with the lathe and file. Much study has been given to the details to make this possible, and at the same time to enable the machine to be handled rapidly when changing from one job to another. This is illustrated by the construction of all the rests and other attachments used upon the table; these can be instantly placed in position or removed by a slight movement of a knurled nut, without the aid of a wrench.

Every feature of the Universal machines that could be dispensed with has been omitted, and such new features have been added as to better enable the operator to grind the common product of the engine lathe, viz.: work revolving on two dead centers—such as shafts, spindles, drill blanks, arbors, etc., either straight or taper. In addition to the quick-handling features, these machines are provided with the new Brown & Sharpe "universal back rest," which is especially adapted for the rapid and accurate grinding of long and slender work. A piece of work with a key-seat, although slender, can be ground as rapidly and accurately as more rigid work. These rests are shown in use in Fig. 3.

Both the table and cross feeds are automatic, the operator depending entirely upon the automatic cross feed for accuracy of size. He has simply to press a

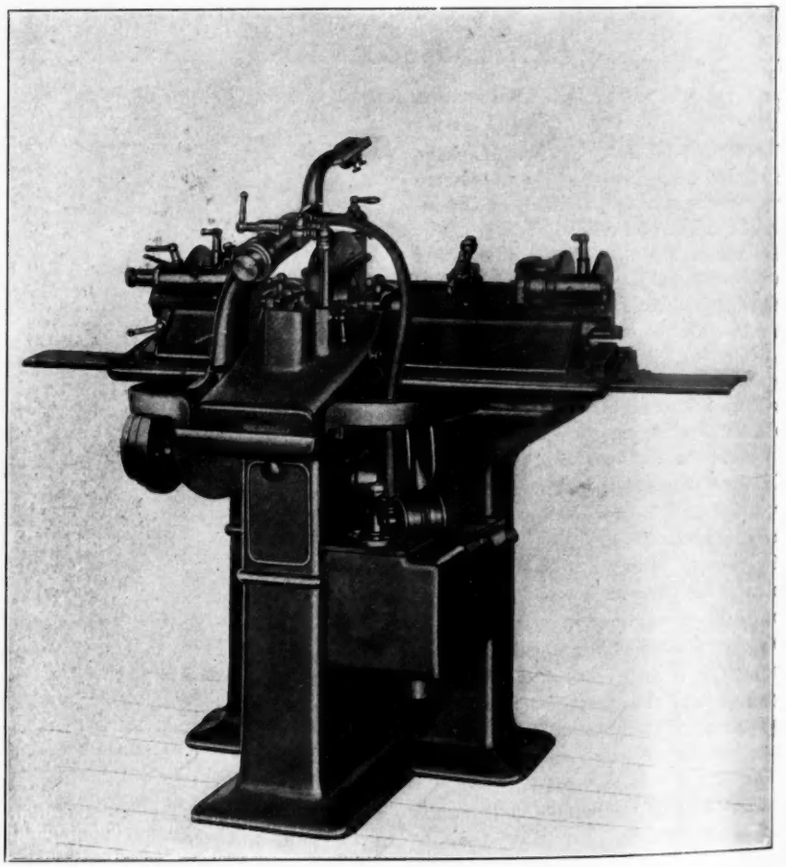


FIG. 2. BACK OF PLAIN GRINDING MACHINE.

thumb-piece, indicating the amount he desires the diameter reduced, the mechanism making the adjustment correctly and producing accuracy within .00025 inch. To insure this degree of accuracy, the construction is such that the wheel slide responds promptly to the least movement of the adjusting wheel, when using either the hand or automatic feed, and there is no tendency of the wheel to jump ahead into the work. The wheel stand is massive, preventing vibration of the wheel. The machines are so designed that the guiding ways of the head and foot-stocks on the table have a large area for maintaining the centers in alignment horizontally—that is, in the direction in which an error would produce the greatest inaccuracy in the work. An attachment is provided for pointing the centers by grinding. It is placed in position or removed in a second or two, and as the axis of its spindle is permanently at 30 degrees to the sliding ways of the table, the correct angle of 60 degrees for the center is obtained without any loss of time. The machine is so constructed that water cannot reach the working parts, the table having the side toward the wheel entirely closed. With this arrangement no water guards are required.

The manufacturers call these Plain grinding machines, to distinguish them from the Universal machines. They are not made plain for the purpose of reducing their cost, but are designed, from the floor up, with a view to produce a larger quantity of the work within their capacity.

Fig. 1 is a front view of the No. 11, especially adapted for work from ⅛ to 2 inches diameter and 1 to 30 inches long, but it will grind work to 4 inches diameter and 33 inches long. Fig. 2 is a rear view of the No. 11. Fig. 3 is a front view of the principal portion of No. 14, which is best adapted to work from 1 to 5 inches diameter and to 48 inches long, but will grind work from ½ inch to 7 inches diameter and from 1 to 54 inches long. These machines are made in three sizes, Nos. 11, 14 and 16. The No. 11 is catalogued as 4x30 inches, the No. 14 as 7x48 inches, and No. 16 as 7x72 inches.

Planer Countershafts.

BY A. L. DE LEEUW.

A planer countershaft is one of the nicest things to get mixed up about. There are generally only a tight and a loose pulley, a pair of driving pulleys, a shaft and a pair of hangers, but it is remarkable how many different ways there are to get these few things wrong.

Every now and then some contributor of the "American Machinist" tells how he did a certain job on a 12-inch foot lathe, that really was intended to be done on a 10-foot planer (which happened not to be handy in his shop), and how he went out to the woodshed and found some tenpenny nails and an old pulley, which, together with some other scraps, were just the things he needed; how he put the pulley on his countershaft, etc., etc., and how the thing just worked like a charm. It should be noticed, however, that whatever countershaft or machine is fixed up in this artistic way, one never reads of such an attempt having been made with a planer countershaft. Not that it never was tried, but whoever did it knew enough not to talk about it, perhaps because he intends to take a patent on it, or, more likely, because he doesn't want the other fellow to know how he skinned his knuckles. Even the innocent-looking trick of speeding up his planer has made many a man think of the sign, "Don't monkey with the buzz-saw."

All this came to my mind when I read Mr. Hess' article on the location of planer countershafts in issue No. 20.

His formulas looked so attractive, so round and sleek, that I couldn't resist trying their inner qualities. I hitched them to a planer with which, at one time, I had some dealings. I started in with formula (1)

$$r = \frac{(d + D)\,D}{cd - D}$$

r is the radius of the small countershaft pulley.

d is the radius of the return pulley on the machine.

D is the radius of the cutting pulley on the machine.

c is the ratio between backing speed and cutting speed.

(I presume it is because of a typographical error that Mr. Hess' article speaks of the ratio between backing speed and return speed.)

On my planer d was 25 inches, D was 30 inches, c was 2½; therefore

$$r = \frac{(25 + 30) \times 30}{2\frac{1}{2} \times 25 - 30} = 51''.$$

Applying formula (2) $R = d + D + r$, in which R is the radius of the large countershaft pulley, I substituted the figures for these letters and got $R = 25 + 30 + 51 = 106$.

This means that my planer should have have a 102-inch pulley and 212-inch pulley on the countershaft. No doubt this might have made a very neat arrangement, but as the shop where this planer was going was likely to be equipped with one or two other machines, I think I ought to be glad I didn't fill the entire shop with my countershaft.

The idea of making the leading belts vertical is evidently a good one. It is plain to anybody that if you tell a man to put his countershaft a certain number of inches away from his machine pulley shaft, he is liable to make a mistake; but when you tell him to place his countershaft so that the leading belts are vertical, he couldn't possibly go wrong if he tried to.

What I will do in the future, I cannot tell. That 212-inch pulley looks so tempting that I am afraid I won't be able to resist it. For this reason it might be well to make a full confession of my past sinful ways before I relinquish them forever.

So far as the location of the countershaft is concerned, I used to think it good enough to tell the customer, "Place your countershaft so many inches to the right or left of your machine pulley-shaft," illustrating it on the foundation plan with a sketch—not thinking there was anything mysterious about this instruction. I used to think, if there was any trouble at all, the trouble was all at my end of the line. The way I used to proceed was thus:

I established the number of pounds pull I wanted on the table rack, and the cutting speed best adapted to the planer, also a suitable return speed. Cutting speed and pull on table give me the number of foot-pounds of energy per minute consumed by the machine. I then added a certain percentage to this, to make up for loss by

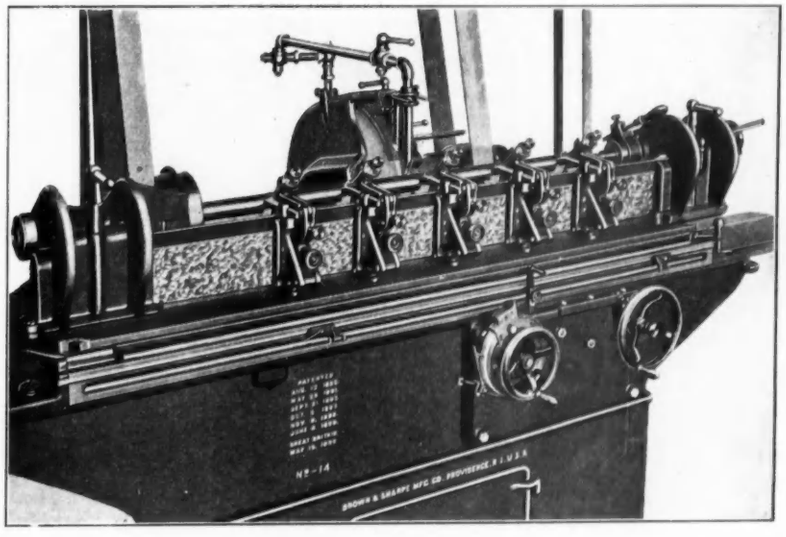
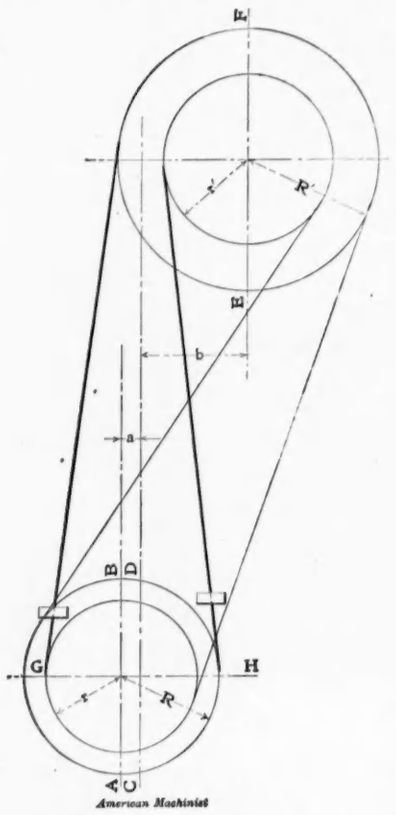


FIG. 3. LARGER MACHINE, SHOWING USE OF BACK RESTS.

friction. This percentage varied according to the amount and kind of gearing and shafting between the machine pulley and the table. I thus found the amount of energy the countershaft had to give to the planer. The pull on the table also gives me what pitch I must take for the rack. The pinion should have as many teeth as practical, certainly not less than 16 or 17, if the action of the planer is to be smooth. The number of teeth of the pinion and its pitch give me the number of inches the table travels per revolution of the pinion-shaft, and consequently the number of revolutions of this shaft per minute.

Here I drop the pinion-shaft and try to find something about my driving pulleys.



LOCATING PLANER COUNTERSHAFTS.

I know the number of foot-pounds the planer needs. This number of foot-pounds I get by giving the belt a certain width and speed. Both these elements, however, are limited. If I make the belt too wide, say more than 7 inches, it will not shift freely and quickly. If I make the speed too low, the same trouble will result. If I make the speed too high, the centrifugal force prevents the belt from hugging the pulley, and the result is—slip. Of course we have to deal with two belts, cutting belt and return belt, the latter running very much faster than the former.

A belt should not run less than 900 or 1,000 feet per minute in order to shift well, nor more than 3,000 or perhaps 3,500 feet per minute in order not to slip. As we know beforehand the ratio between cutting speed and return speed, and as that ratio is generally somewhere between 2½ and 4, one will usually find that the cutting belt cannot run much more than 1,000 feet, nor the return belt much less than 3,000 feet; so that, as a rule, there is very little embarrassment of choice for the designer.

After the proper belt width and speed are chosen, the question arises: how to get the speed; either by making a large pulley with a few revolutions, or a small pulley running at a high speed. The return pulley, running at the highest speed, generally determines the size of our pulleys; as, for reasons familiar to anyone who ever had anything to do with machinery, too high a speed of shafting is objectionable. On the other hand, the dimensions of the machine generally prevent the designer from chosing his pulleys too large.

Considerations like the above lead me to take 50-inch and 60-inch pulleys for the planer mentioned above.

There is one other important point that should not be forgotten. One generally makes the return pulley on the planer smaller than the cutting pulley, so as to make it run fast without making the corresponding pulley on the countershaft too large, but one should take care to make the difference in diameter between return and cutting pulley not too great. The reason is this: at the end of the cutting stroke, the belt is shifted off the tight cutting pulley, and there is a single moment during which neither belt works. During that time the planer goes on cutting by the momentum of the cutting pulley. The shifting proceeds, and the return belt gradually slides on its pulley; which, just now, is running in a direction opposite to that in which the belt runs; the belt therefore acts like a brake, and must overcome the momentum of both tight pulleys before it can start the planer on its return stroke. Now if the return pulley should be small and the cutting pulley large, the return belt would have little leverage when trying to overcome the momentum of the big cutting pulley; the result would be slip and squealing.

The size of the pulleys being determined, one can easily find the number of revolutions they make per minute, as the belt speed is known; and as we have already found the number of revolutions of the pinion-shaft, we now also know what amount of gearing we have to introduce between pinion-shaft and pulley-shaft.

Next we look after the countershaft. We place on that shaft a cutting pulley, as small as practicable without incurring danger of slippage; and having now determined three pulleys, and knowing the ratio between cutting and return speeds, one can easily figure out the size of the fourth pulley. Anyone who knows his arithmetic and the nature of the problem he is trying to solve, can do it. I do not believe in formulas for little things like this. They don't help a man to solve a problem any better, and if he leaves his formulas at home in his Sunday vest pocket, he is of no account when he meets the problem. He would better use his common sense and the little arithmetic he learned at school, which he will find to be quite sufficient.

We must now locate the countershaft as in the sketch. $A\,B$ is a vertical line through the machine shaft; $E\,F$ is a vertical line through the center of the countershaft, and $C\,D$ is the line which bisects the angle between the leading belts. We try to locate the countershaft in such a way that this line becomes vertical. By doing so, both leading belts will go out when the countershaft is placed higher, or in when the countershaft is placed lower; and the change of position of the belts in the belt eyes becomes a minimum.

By making $C\,D$ vertical, the distance $G\,H$ (which is equal to $r + R$) is halved; each half therefore is $\frac{R+r}{2}$. The distance a between lines $A\,B$ and $C\,D$ is, approximately, $a = \frac{R - r}{2}$. In a similar way, one can figure the distance b between lines $C\,D$ and $E\,F$ to be $\frac{R' + r'}{2}$ and therefore the horizontal distance between countershafts becomes

$$\frac{R - r + R' + r'}{2}$$

This formula changes somewhat when the crossed belt is used on the return pulley, but is found in the same manner.

This is the way I used to get at it when I did not know any better. You see, I used to think the location of the countershaft was only a minor consideration and that the size and speed of pulleys and similar things had to be considered first. But of course I know better now. I will get my belts vertical and let the rest of the planer take care of itself. If that isn't the best thing for the planer, it certainly is for the man who sells the pulleys. I'm sure he doesn't get an order for 212-inch pulleys every day.

My way of getting at the location of the countershaft is rather a long one, and a troublesome one, and cannot be expressed in one or two, or even a whole dozen, formulas; and worst of all, the leading belts are not vertical. But it explains why changing the planer shaft is almost as dangerous as monkeying with the buzz-saw.

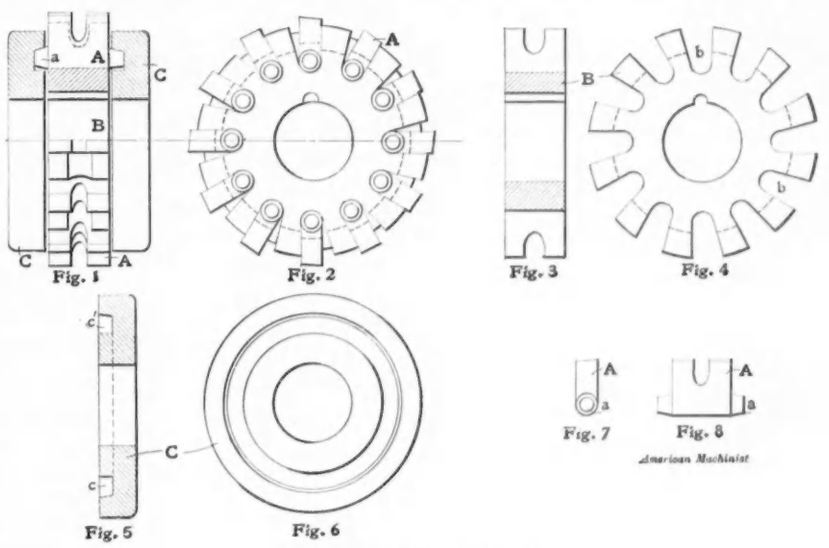
Hamilton, Ohio.

Because a solid can be moved, we know that a point can be moved; its path is called a line. By moving a line we obtain a surface. When a surface is moved, it usually traces a solid. A point can move in a line, a line in a surface, and a surface in a solid; in what does a solid move? In a fourth dimension. Thus the fourth dimension is the path described by a solid.

An Ingenious Novelty in Milling Cutters.

We take from "The Engineer," London, the cut and description herewith of an interesting novelty in milling cutters. For cutters of large size the idea may be a valuable one, and first-class tool makers will be able to see what there may be in it without farther explanation than is here given. The cutters here described are made and used by the Garrard Manufacturing Company, Limited, Ryland street, Birmingham, England. The following is the description:

The object of the invention is to make the cutting blades separately from the stock, but to so arrange and connect them with the stock as to permit of their relative adjustment. Figs. 1 to 8 show clearly the construction of the device. As will be seen, the teeth *A* are separate and independent, and have their inner ends rounded to rest upon a corresponding seating at the base of each of the apertures in the stock *B*. Conical lugs *a* are also formed on the teeth and fit in corresponding recesses in the caps *C*, which are detachably connected to the tool stock by means of clamping nuts screwed on to the mandrel by which the complete tool is rotated. It will be observed that the outer side c^1 of the recess *c* in the caps is tapered, so that when the caps are tightened a wedge-like action is set up between them and the lugs, effectually securing the teeth to the seats of the apertures. When the caps are slackened, the teeth can be turned through a small arc in either direction to the extent of the difference between their width and that of the grooves. When all the blades have been turned against one side of the grooves, and secured by tightening up the caps again, their outer ends can be turned to the desired shape in a lathe. After this operation they may be removed for hardening. On replacing them in the tool holder, they are rocked over to the opposite sides of the grooves and secured. The teeth are then at the required angle for cutting. The precise angle of the teeth —which is fixed by the dimensions of the apertures relatively to the teeth—is, of course, determined by the work for which the milling cutter is used.



A NOVEL MILLING CUTTER.

Criticisms on the General Construction of Machine Tools.*

BY A. R. BELLAMY.

I have often thought that it would be a good thing if engineers' tools were sold with some form of efficiency guarantee. I dare say most of you may often have been disconcerted by comparing the time a workman has taken to do a certain piece of work with the theoretical time you have figured out for it. My plan has always been, when setting a piece-work price, to carefully calculate the amount of surface to be machined, and then by allowing certain cutting speeds and rates of feed, I arrived at the theoretical time it should take to remove the material. To such time was added what was considered necessary for setting the work, changing the tools, etc.; but in most instances the line of variation between theory and practice was, to say the least, confusing. On investigation it was invariably found that I had omitted to allow for time lost in playing round and fiddling about with the machine itself—taking ten minutes to alter this feed, five minutes to alter that motion, and so on, and it is upon this loss of time, caused by inherent defects in the tools themselves, that it is intended to speak about later.

But to return to the efficiency guarantee. Suppose you take any piece of work that requires machining and calculate theoretically the time required to do the work, and put this time down as the maximum efficiency. If then you are going to purchase a tool for doing the work, why not set this time down in your specification and get makers to state what percentage of efficiency they will guarantee on your time?

In these days most tools are bought for certain definite purposes. As an instance we will take small connecting rods, and it is decided that these articles are best dealt with in a taper turning lathe. Now, it is easy to calculate the exact length of time it should take to turn a given amount of surface. You can settle upon, say, 20 feet per minute cutting speed with a feed of one-eighth roughing and three-sixteenths finishing. The total time required for the actual machining will be the maximum efficiency you have settled upon. When you order a lathe for doing this work why should you not have a guaranteed time stated by the maker?

I am aware that manufacturers of certain special tools do advertise, and are prepared to sell their machines on some such conditions, but the practice is very exceptional, and most tool makers absolutely ignore it. In my opinion this question of time efficiency would do a great deal to improve the design and construction of many tools.

The day has gone past when a good tool means a machine well and solidly built, and capable of doing first-class work. The element of "time efficiency" is now the important clause in the contract. What use is it to me if I have a number of splendid tools made by first-class makers and capable of doing good work at the end of the next centrury if my neighbor is equipped with a plant which enables him to undersell me 25 per cent.? It is no satisfaction to be told that my competitor's plant will be worn out in ten years, because in that time I am worn right out of the market and my plant only remains as so much evidence of "how not to do it."

LATHES.

Now, I suppose the lathe is about one of the oldest of machine tools, and is therefore one that most people would expect find made to a standard design. I mean by this that all the good points of such a tool would be known, and a buyer would not anticipate when purchasing, say, plain 10-inch [20-inch] engine lathes from several makers that he would get a number of tools that looked alike, but that beyond this the similarity ended. Why this should be so is an enigma to me.

Take such a spindle detail as the direction of rotation of the handles on the compound slide rest when putting on the feed. There is no uniformity; every maker seems to follow his own bent. My idea is that when you stand by the saddle of the lathe, with one hand on each of the handles that give motion to the screws in the compound rest, and when those handles are on the top of their revolving path, then, when you push them away from you

*From a paper read before the Manchester (Eng.) Association of Engineers.

the tool should move away from you, and vice versa. This may not be the opinion of others, but at any rate, is it not better to have one standard method? I don't care which particular style is adopted, but do adopt one. As it is at present, much time is lost and unnecessary bad language indulged in through this little detail.

At one time we thought seriously of putting up some such notice as this at the entrance to our works: All turners and machine men in our employ are expected to be ambidextrous, and in order to prove this they are requested to come for their wages each week rubbing their stomachs with one hand, and at the same time beating their chests with the other; if, moreover, while performing this anyone can scratch the top of his head with one of his knees the feat will not be considered a bar to his promotion. Instead, however, of issuing such a notice, we came to the conclusion that the best plan would be to make all the lathes alike, and take care in future to order them with this detail as we required it. Now, many of you may consider this to be a very little matter, and one of small importance; but if the tale I heard the other day be true, I can assure you that it is of far-reaching consequence.

You are all aware of the nervous tension there has been in this country owing to the war in South Africa, and the anxiety to hear of the landing of our troops out there. Well, would you believe that the fate of the war almost rested upon this very question? So far as I can bottom the tale, it is this: One of those antiquated transports which our government hired as a "greyhound" had on board one of our crack regiments, and was proceeding to sea, when a bolt broke. This was on a Saturday morning, when, of course, things of this sort do occur. Well, the celebrated firm of "Rush & Chancit" was appealed to, and a new bolt was soon in the lathe being turned. The man on the job was on the "finishing cut" when the "buzzer" went, and, as he *had* to leave, one of his mates was deputed to take up the job. He came on at 1:30, after a pork pie and a glass of soda water, and found his mate had stopped the lathe with the tool half way along the "finishing cut." So he set on the lathe, and after calipering found the tool was running in and making the bolt undersized. He must bring the tool out, but which way to turn the handle? He had left his encyclopædia at home containing particulars of how to turn all the handles of all the tools in the shop, so after a period of deep thought he stopped the lathe, and in his agony of mind went off to a football match, and so far as I know the blessed transport is waiting still.

I do not know whether I am particularly unfortunate, but a short time ago we received a lathe which had the slide rest handles all right, but the screw in the loose headstock was different from our other lathes. What was the result? When the man came to work on that lathe he just kept dropping the work out of the centers continuously. In a few days that intelligent workman was a haggard, wild-eyed demoniac, and in order to save his reason we had to induce him to sit in an armchair in the board room, drink whiskies and sodas, smoke some of our best cigars, and read a book called "Fox on the Martyrs," while we were busy putting a new screw in that unfortunate headstock.

I have the same complaint to make about the direction of rotation for the screws in ordinary jaw chucks. There is no standard, and when a workman goes to a chuck he cannot tell, without first trying, whether when turning the handle clockwise the jaws open or close.

Gearing.—My experience is that in most lathes the difference is much too great between the last single speed and the first geared speed. As an example, the speed on the slowest single speed is 80, and the quickest, with the back gear in, is 30. Now, this difference is much too great. I am aware that a few makers now manufacture lathes with an intermediate gear, but the practice is not common by any means. In my opinion you cannot have too many changes of speed, so long as they can be altered quickly.

This point, however, draws my attention to the method of changing the gear. Take such a simple circumstance as putting in the back gear. Why is it that one lathe has the eccentric movement and another the plain spindle which requires to be pushed in and pulled out? I know the arguments brought forward by the makers of the latter arrangement, viz., that it is the best for the gearing, but is this not again the old question of the life of the tool versus its efficiency? One objection that I have to the plain spindle is that the shaft carrying the back gear protrudes through the headstock and necessitates that the face plate should be carried further away from the headstock. The eccentric is by far the quickest to operate, and if well made is, in my opinion, quite equal to the other. Yet, with the eccentric movement some makers have got their little whims to satisfy, and so we get some lathes with handles on the end of the shaft for putting the gear in and out; and in others the shaft is ended up in the form of a hexagon nut. In this latter instance it is necessary to use a spanner, and of course the man, when coming first on the lathe, always forgets that spanner for the first month or so, until he has worn a track round the lathe looking for it. One of our men carries the said instrument behind his ear, as you would do a pen, but Providence, or his parents, have provided him with rather unusual auricular appendages.

I will only just mention that the question of cast gear versus cut gear remains still a subject of discussion. Why it should be I don't know, because my experience is that cut gear, properly done, runs much more smoothly than the best cast gear.

The next important point is the method of changing the feed. The old way of doing this, by altering the change wheels at the end of the lathe, is much too slow. We cannot spare the time in these days for the workman to pull out a roll of paper and figure out the necessary change wheels required to alter the rate of cutting by 1-16 inch. If the man is on day work his thoughts are rather apt to wander off to the bar parlor of the "Cat and Compasses," and if on piece work his appreciation of the tool maker is likely to be unfavorable.

My humble opinion is that all changes of feed should be done by means of gears which can be altered by the simple movement of a lever. It may be that many of you may be saying to yourselves: "Why, all these points are embodied in modern lathes." But I will reply that it is not so, and I have fairly recently purchased lathes from first-class makers that not only require the gearing to be changed to alter the rate of feed, but also necessitate a clumsy alteration of change wheels merely to change the direction of the feed.

Slides, Rests and Saddles.—In most large lathes the slide rest is too high and does not permit of the use of a large section of steel for the tool. If the whole rest were kept lower the tool could be packed up when required, and would give the workman the option of using either a large tool holder or a bigger section of steel. There is no objection that I can see to packing up a tool, as very often this packing piece can be extended under the tool and acts as a support when work is being done which requires the tool to stand out a long way from its rest.

The saddles should be designed so that the turnings and the water can get clear away. Several of our lathes are so constructed that the water runs off the tool on to the saddle, and, after flooding it, runs over the end, drips on to the workman's feet, and then makes a nice little stream across the shop floor. This may be very nice as an aquatic display, and reminds us all of a marine park, but in our works it is a little out of place, and it hurts our feelings when the turner makes a request for a pair of fisherman's wading boots. Where water or other cooling medium has to be used, then proper preparations should be made to deal with it. The present system of putting troughs under the lathes is very primitive and inefficient.

I would meekly remark that tool makers have not got beyond the pre-historic old form of water can that requires the services of a laborer to hold it in position and coax it to do its duty in a respectable way. The whole arrangement is so troublesome and wastes so much time in preparation that most workmen never use water when they can possibly avoid it, and so there is time lost and money wasted in grinding and repairing tools. I am aware that mill-

ing machines, and certain turret lathes, have a properly designed system for this purpose, but I think it ought to be put on all lathes that have to turn either wrought iron or steel.

When lathes are fitted with front and back rests the workman ought to be able to operate either or both rests in any direction from either side of the lathe. In many lathes the saddles stand out too far from the bed, thus necessitating a good deal of walking round. It may be the designer of the tool has considered that a little exercise would be beneficial, but our men prefer to take it by cycling in the evening.

In hollow spindle lathes the general method of holding the material by means of a box chuck is slow, tedious, and, if the rods are large, requires a lot of exertion. You are all familiar with the chuck I am referring to, where a large spanner is used for loosening and tightening the outside casing. We have a good capstan lathe which takes up to 2½ inches diameter, but we find the greatest difficulty in keeping a man on it. The weight of the spanner is about 12 pounds, and the force required is so great that light, handy men, who make the best operators on these tools, cannot do the work. On one machine we very often have a laborer assisting. You see the instruction card sent with this machine said nothing about the advantages of the tool as a physical cultivator, and we didn't order it to take the place of a "Sandow Exerciser."

In most large screw-cutting lathes the handle for engaging the nut with the screw is put in a very awkward position. The workman is nearly two-double, and even then he would be all the better with the arms of a chimpanzee and the neck of a giraffe. To my mind the screw should not be placed where it generally is, because it does not seem very mechanical to give movement to the saddle by pulling and pushing it at one side only. There must be a tendency to cross-winding. On all screw-cutting lathes there should be a quick motion for withdrawing the tool at the end of the thread. This not only saves time, but prevents work from being spoiled. I mention this because I note its absence in a lathe which we have recently purchased.

It would be of considerable convenience to users if lathe manufacturers would adopt a standard thread for the face plates of their lathes, and also arrange a standard set of sizes and tapers for the "loose centers." At present every maker has a different screw for the face plate, which prevents chucks from being interchangeable; and lathes centers are all sorts of tapers, which precludes a stock of centers being kept ready for immediate use. The example of the Morse twist drill might be followed with advantage.

PLANING MACHINES.

The first criticism I will pass on this tool is on the use of the single driving belt. The cheery squeak of this belt as it passes from pulley to pulley may be considered by some to denote activity; but to my mind it suggests delay, and further, that the belt is having a bad time of it. From my experience the two-belt drive is much more effective. The return motion of the table is much too slow. To a poor gas engine manufacturer, who really *cannot* afford any time at all for the machine to reverse in, it is heartrending to watch his planer quietly meandering back at the "Dead-March-in-Saul" pace of 50 feet per minute. The handle for reversing the motion of the table is also placed in a very awkward position, as it moves over the place where the man is supposed to stand. I have stood and watched that handle, and when it suddenly whizzed round with that spiteful sort of movement, I have wondered what sort of a tempered man first designed it. I think he must have been a misanthrope with wooden legs, but as few makers think of altering it I can only conclude that it is the one little joke that is left to the planing machine manufacturer, which he cannot deprive himself of.

The tool boxes should be designed to give the largest amount of movement, and here again we have the old difficulty of the direction of rotation for moving the tool. I am not going to enter upon the thorny path of disputation by giving my opinion upon rack, screw, or worm motion for the table. As a user, I want the machine that will travel the quickest and do the best work.

SHAPING MACHINES.

My first objection to this tool is the wasteful method of changing the stroke. In large machines this is particularly noticeable. I have observed that the slotted link at the back of the machine has been beautifully divided so that the workman can tell exactly where to put the driving block; but just stand by and watch the operation. The nut is loosened a little, and the man proceeds to hammer the slide block either up or down, or he frees the nut a little more, and then the block drops to the bottom of the slot. Then commences a playful little scene, reminding one of a "catch-as-catch-can" wrestling match, and the onlooker cannot help but be struck by the silent irony of that beautifully divided slotted link.

If this be the only method that can be devised, then why not arrange a screw for moving the position of the pad or block? I think that the change of stroke should be altered at the front of the machine. The present way is so much labor that the workman's idea seems to be how long he can do without changing. It may give an aristocratic air to the works to see the shaping machine heads passing lordly across the work, with a foot or two to spare at both ends, as though the proprietors were millionaires, and not to a "bit either way;" but, as I have previously stated, we are poor people and wishful to be saving.

The carriage carrying the heads of large shaping machines should be moved by power, also the tables both vertically and horizontally. The present method of moving these parts is laborious and slow, and the pinch-bar system of moving the tables across the bed reminds one of a platelayer's job on the railway. One kind maker sent us a pinch bar with a wonderfully fashioned end, so that if you just missed one notch and the next was partly blind then you turned the bar around, and so on. Given that you had to move the table across the whole length of the bed, then you could have about as good a substitute game for the child's box of puzzles as anything that I have ever seen.

We are again faced with our old friend, direction of rotation in the feed motion of the tool box, and it does not add to our comfort to have customers asking us why we have so many "oil grooves" in some of our parts where oil is not required. We have one poor man working two machines, and the direction of rotation on the machines is diametrically opposite. This man, however, being a philosopher, has studied the teaching of the "good old book," and doesn't let his right hand know what his left is up to; so he works the handle on the tool box of one machine with one hand, and the other machine with his other hand. This has got us out of the difficulty for the time being, but I am afraid it will pay us in the long run to reclaim that bastard tool.

The automatic down-feed on the shaping machine is, in my humble opinion, downright funny. When you first see it you wonder where the idea has come from, but after a while you come to the conclusion that the designer must have been inspired by watching the elbow of some itinerant fiddler. The makers have always supplied us with this beautiful motion, but it is far beyond us, and so we have taken it off and put it safely away in our strong room with the gold medals and other things that we are proud of and value. We should like, of course, to have an automatic down-feed motion on all our machines, and have seen and admired some working a long way from home that only required the simple unlocking of a nut and the movement of a lever which was fixed close to the tool box to accomplish the purpose.

DRILLING MACHINES.

I have not much to say about these tools, excepting that I think even the simplest drill press should be made to reverse, and that all radial drills should have a proper power motion for raising and lowering the arm something a little better and quicker than putting on and taking off a belt.

I have really not exhausted my subject by any means, and have not even touched on milling machines, but I am looking forward to learning something from the discussion on this paper, so I will now generalize my remaining remarks.

The worst fault I have to find in most tools is that they are short of power. As

a rule, the belt speed is too slow, and the gearing is too weak. If you take almost any tool and adapt it for electric driving, where there is no slip of the belt, you will find that it is only a question of time before the gearing begins to give trouble and ultimately breaks down. Almost every tool I have bought is defective in this detail, and could have easily been improved with a little forethought and at very little expense. In this respect my experience has been shared by most of my friends. A few days ago I was looking through one of the most up-to-date shops in this district, and the same lamentation was there, viz., want of power. The tools would not do what they were led to expect, and all sorts of excuses were made by their makers.

All large machines that have heavy parts that require to be moved should be fitted with a power motion to such parts. Except in a few cases, quick "hand traverse" should be done away with, and quick "power traverse" should be substituted. A short time ago a machine came into our works that required the table which carried the work to be brought back to about the end of the bed before commencing another cut. A star-handle on the end of a screw was the "quick hand traverse" supplied. What was the result? A laborer was always hovering round. It took him about seven to twelve minutes to do what was required, but then he had to be about when he was wanted; so the result was about ten minutes' work and perhaps an hour's reflection on Political Economy. We spent about £15 on putting a quick-power motion to that machine, and now the laborer's task is o'er, because the mechanic can, by moving a lever, get the table back in less than one minute.

LUBRICATION.

This is as a rule very defective. A few holes drilled up and down the machine and plugged with a bit of waste, or a splinter of skewer, is generally considered good enough. Quite recently my attention has been drawn to this point through having two very valuable machines badly damaged. It is these little details that help to make success or failure. All parts requiring lubrication should, where possible, be fitted with proper lubricators, and parts that are difficult to get at should have the oil led to them by pipes, such pipes to come from one common oil well, as is the case in modern high-speed engines.

FOUNDATION PLANS.

These as a rule are very incomplete. Take a plan for a lathe; if you get anything it consists of a few lines that look like a Rontgen-ray photo of the tool itself, wherein the cone pulleys and the lathe feet are the only parts that *will take*. You might say, "Well, what more do you want?" Generally, you require a deal more. You want to know the best hight to fix the tool above the floor line so that it can be the most easily worked, the best method of driving it, angle of belt, etc. If there be any gearing close to the ground what space should be allowed for comfortably getting at it; and if by chance the tool does require to be taken asunder for repairs, you don't want to take down your traveling crane, remove your boiler chimney and shift your office safe in order to be able to do so.

TESTING.

In my modest judgment I think it would be very desirable that every tool should be thoroughly tested before it leaves the maker's works; not merely put to work, but properly tried with some of the work that it will be required to do. I am sure the result would be beneficial to all concerned. I do not know whether I have been particularly unfortunate, but with the exception of one or two machines and a second-hand grindstone, almost every tool has required more or less—generally more—adjustment before we could get it to really tackle its job.

DESIGN AND IMPROVEMENTS.

With the exception of milling machines and a few special tools, most engineers' tools want getting up to date. I think it would be a good plan if all drawings of machine tools, that had left the maker's factory, should be taken out of the drawing office and carefully locked away in the proprietor's deed boxes. We should then have machines designed *de novo*, and not the old thing over and over again, or a selection of antiquated parts dished up in a new form. A friend of mine showed me an article the other day, and asked me to compare it with another that had been working in his place for twenty-six years. Would you believe it? They were identical! Yes, there was *Perfection!* and my friend had been for twenty-six long years blissfully ignorant of it. I do not for one moment wish to suggest that this is an example of machine tool practice, but at the same time I do think that the development of engineers' tools has been very slow, and that defective design has been too long slavishly copied.

And now, gentlemen, before I resume my seat, I should like to again remind you that I am but a mere gas-engine manufacturer, and therefore please deal gently with me in your criticisms. If at times I have treated the subject with some little exaggeration and some indifferent humor, I trust that I have not wounded the tender susceptibilities of anyone present. I feel sure you will give me credit for having better taste than that. My object has been to relieve a little what would otherwise have been a very dry subject. I am also well aware that it is "easy to find fault," and difficult to suggest remedies; but I feel sure that if this weak attempt on my part to ventilate the subject will be the means of giving it some prominence in your thoughts, then the result will be to the advantage of the engineering trade generally.

Molding a Lathe Bed.

BY L. C. JEWETT.

The molding of lathe beds, the ogee style particularly, and also the beds of planers, shapers, etc., calls for skill and thoughtful care of no mean order. To mold a lathe bed as here illustrated, the bottom board should be laid level and firm upon the floor, digging out to let the hinges down. To have the nowel level when placed upon it and out of wind is of paramount importance. The same applies if molding without a bottom board, as is frequently done.

Fill the nowel with sand, and when it is firmly, but not hardly, rammed, it should be about 2½ inches from the face of the flask joint. Place the whole pattern into the nowel, blocked up to have the top of the rail part from ½ to ¾ inch above the face of the flask joint, Fig. 1. This gives better clearance when the cheeks are rolled off when the mold is opened. Place weights upon the pattern, when in correct position, to keep it there while ramming the bottom, sides and ends. Tuck up the bottom good and firm; there not being much surface, there is not much vent and it can be quite firm, especially if the pattern is deep and the sand not tempered too heavy. The bottom being tucked and the joint rammed firmly, don't fail to get this joint hard, to resist the strain of liquid metal. It has also to resist the rammer blows while the cheek is being rammed up, and should not yield under the blows of the rammer.

The cheeks (see Figs. 2 and 3) being ready, they are put in their proper places, end pieces are put in position, bolts are put in and quite firmly screwed up. Pieces of boards are fitted at the ends of the cheeks to retain the sand, so that perpendicular joints can be made at the ends of the cheeks, as per dotted lines (see Fig. 1). When the cheeks are rammed up remove the bolts, remove the two end pieces (see Figs. 4 and 5), make up the cheek joints at their ends, as before referred to, and keep this truism ever in mind: Firmest joints insure clear separation of parts and clean lifts.

Make the joints with sharp sand or paper; and if the latter, tack it to the joint surfaces. Place the ends, Figs. 4 and 5, in position again and rebolt the flask. There is bolting and bolting in this instance. Do it P. D. good, so that when the final bolting is done there will be small liability of crushing by the bolts squeezing too hard. Put in pouring sprues as seen in Figs. 4 and 5; ram the ends firmly, and knowingly back of sprues and of gates, that leaks cannot result from strains.

All parts of the cheeks being rammed up, remove the weights from the top of the pattern, make the joint ready for and place on the cope in position. Do not neglect at this stage of the proceedings to clamp up the whole flask and draw the

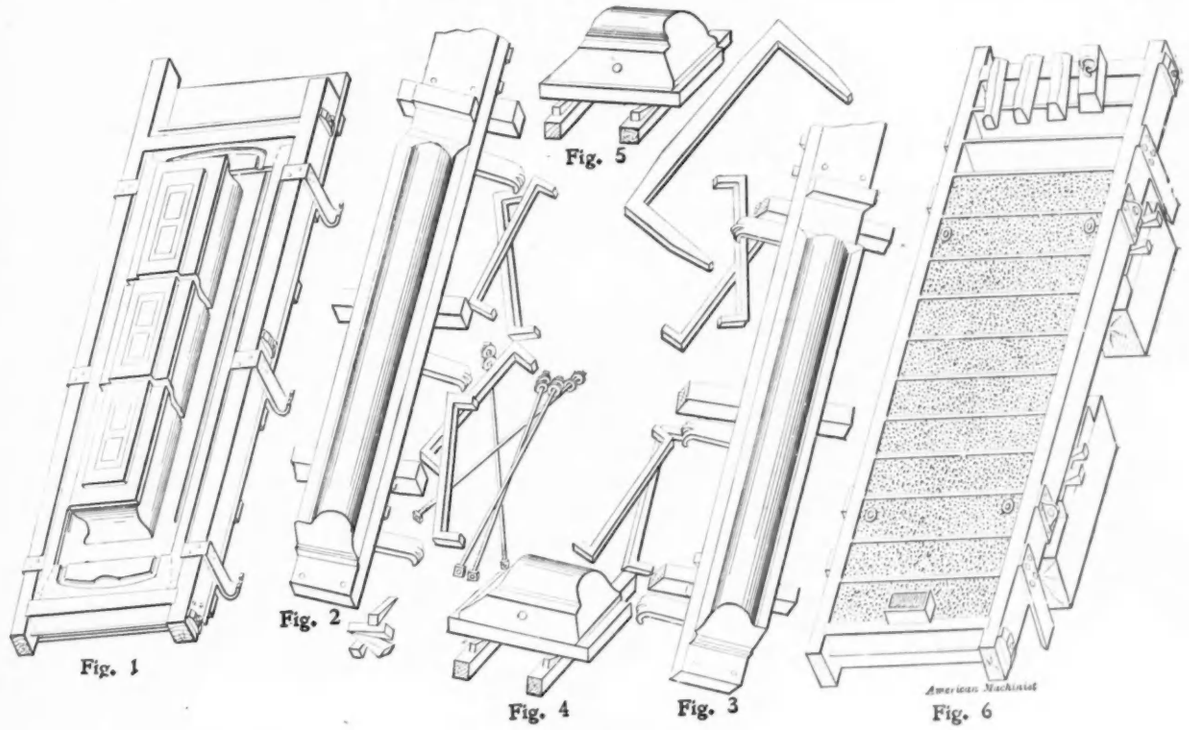
clamps tight, so that when clamped for good, less, if any, danger from crushing will be liable to happen. While the cope is being rammed, have stays put on to guide cope on and off. Owing to the fact that the cheeks are liable to, and do, assume different relative positions to each other each time used, guides by pins are impracticable—in fact, impossible. Lathe bed molds are susceptible of and are shortened to length of casting desired. Copes are rammed up to cover the length of joint, as per Fig. 6.

When the cope is rammed up and removed, it is blocked up on the floor, the joint of the cheek, being brushed, swabbed and vented, the top part of the pattern is rapped and drawn out (ogee patterns are separated longitudinally). The bottom part of the pattern is rapped moderately. Bars 1¼ inches or so in diameter are inserted in holes bored vertically in the top joints of the long cheek sections, and they are started easy and evenly back on the hinges. The cheeks are laid on skids (see Figs. 2 and 3). The ends are rolled back in the same manner and placed away from the nowel, in order to give ample room to build the inside core, and for the general finishing of this part of the mold at closing. Joints (of bias joints) are shaved, and back parts of joints are cut away for secure tucking. After swabbing and venting the lower part of the pattern, rap and draw it out, put in the tracks, false strips and other parts that are placed in this part of the mold, to shield it from possible harm while the corebox is put on in proper place and the core is being made.

Ogee lathe bed cores are made in a box separate from the pattern, and usually upon the mold, and are not disturbed from where they are made. It is better to have the top of a green sand core come a trifle scant in hight, say ⅛ inch. I have seen ¼-inch space between top of core and the cope's surface, but it was a clean opening in the casting; compression of the core raised it to a bearing up to the cope. Lathe bed cores should have evenly and not too heavily or wet tempered sand, not rammed too hard, and well vented, as there are many rods inlaid with clay wash on them, that will increase the dampness of the sand. Clay water, if used, should be very thin. Water alone is quite sufficient to dampen securing irons for the core with.

Lathe bed castings are notorious, in their whimsical proclivities for crooking, as all molders who have been shopmates with them know. To get them straight as cast often requires much experimenting. The crooking is largely due to the want of proper proportions in top and bottom, so that each side will cool equally. To facilitate and equalize this, certain portions are stripped of sand soon after pouring. Good results have been obtained by digging out the sand down to the casting from the bars of the cope, leaving the holding-down clamps on in some instances all night, emptying three or four center spaces of bars or two or three from each end, as the case may require.

There is considerable side pressure to lathe bed or other long castings of any depth. Binding clamps are used, like the large one shown in the sketch, to prevent side straining. Separating a mold in this manner makes a good opportunity to finish the mold, and is much to be preferred to the method of sliding the sides away.



MOLDING A LATHE BED.

An Annealing Machine.

This heating machine was specially designed and built for the United States Mint at Philadelphia for the purpose of annealing bars and strips of silver. The metal comes from the melting room in the shape of ingots and first passes through the "breaking down roll," where it is reduced to a strip about one-third of the original thickness of the ingot. The strips thus formed must then be thoroughly annealed preparatory for the second rolling, and the annealing process is repeated after each rolling, until the stock is reduced to the required thickness.

While a perfect anneal is always essential for proper rolling, it is especially necessary to have a perfectly uniform anneal before the strips reach the finishing roll, which cannot turn out strips of the perfectly uniform thickness required unless the ductility of the metal is uniform throughout the whole strip.

The machine consists of a long heating chamber or oven, with provisions for a perfect control of the temperature, and the machinery for conveying the work through it at any required speed. The length of the heating chamber is about 10 feet, and the conveyor consists of twenty-two hollow cast-iron rolls on hollow shafts *S*, mounted transversely in the heating

chamber, and above the burners *B* which enter the lower part of the chamber.

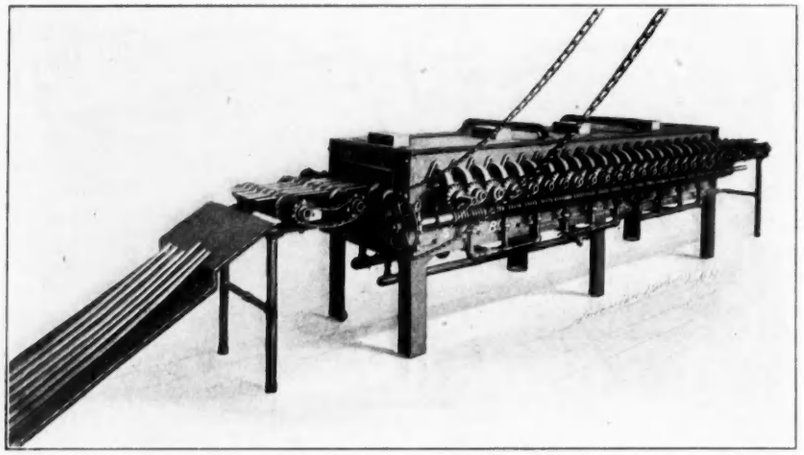
The rolls are ribbed, so as to divide the face of each into six equal spaces, in order to separate the strips from contact with each other. These ribs are high enough above the face of the rolls to guide the strips in a straight line of travel, as shown in cut. The rolls are about 4½ inches in diameter, and placed as close together as possible, thus giving the strips continuous support at intervals of 5 inches, and they are thus propelled through the heating chamber by the rotation of the rolls.

The hollow driving shafts on which the rolls are mounted project through the side walls of the heating chamber, and are rotated by gears, all driven by one shaft, on which a separate worm for each gear is mounted, thus securing the perfectly uniform rotation of all the rolls in the direction of the discharge. All bearings of the roller shafts, as well as the driving shafts, have roller bearings, in which proper allowances have been made for expansion when heated, and with the accurate adjustments made from experience, the power required to operate the machine is reduced to less than 1 horsepower. The power is transmitted to the driving shaft through a speed regulator, which affords the means of regulating the speed of travel through the furnace with precision at any required gait.

The burners enter the heating chamber just above the floor line, and are divided into three sections, with independent gas and air supply valves to each section, for the purpose of controlling and adjusting each one of the sections independently. All three burner sections, however, receive their supplies of gas and air through one main gas and air valve, so that when once adjusted by sections to the gradations of heat that may be required in different parts of the furnace, the whole furnace is controlled by the two main supply valves.

The burners *S* inject the mixture of gas and air into the heating space below the rolls from opposite sides horizontally, and are so proportioned that the focus of each flame reaches across the heating chamber nearly to the opposite wall. The burners are so spaced that the flames from the opposite sides pass one another at even intervals, and a very even distribution of the heat transversely is thus secured. The equal distribution is further secured by forcing the heat upwards through the narrow intervals between the rolls, which practically cover the heating chamber throughout, and a perfectly even application of the heat to the whole body of the rolls is thus accomplished, there being no difference in the heat color of the rolls on any part of their surface.

For feeding and discharging the strips, they are placed on the rolls before the entrance and are propelled into the heating space, while at the discharge the outside rolls receive the heated metal and propel it to the cooling tank.



ANNEALING FURNACE FOR SOFT METALS.

The furnace here illustrated will anneal six strips 26 inches long by 3-16 inch thick per minute. When these strips after the second rolling are annealed again the speed of travel through the heating space is increased by adjusting the speed regulator, so that the thinner strips then pass through the furnace at a speed of from one-half to three-quarters of a minute, according to thickness. Without going into the statistics of the actual work now performed by this machine, it is evident that the time required for annealing any given size of strips is only limited by the length of the heating chamber. The longer the heating chamber is the more rapid can the travel be, so that an annealer can be constructed which will turn out any quantity and size of work as fast as it can be handled.

For all the strips called for in the United States mint, excepting the thickest, just from the breaking down roll, the machine now in use is of sufficient length to keep the man who feeds it busy, and for thicker strips or heavier work additional length of chamber can be provided, so that any work can be put through in a properly proportioned machine as quickly as it is possible to feed it. Where large quantities of the same size of stock, round, square, or flat, are to be annealed, a machine can be built upon the simple statement of how many pieces of specified length and thickness shall be annealed per hour.

It thus seems that in this apparatus the theoretical requirements of a perfect anneal are fully complied with. The metal passing through evenly heated space, is exposed to the proper degree of heat for a perfectly uniform length of time, and every piece is subjected to exactly the same conditions as any other piece, so that there can be no difference in the anneal, either in different parts of the same strip or any number of strips annealed under the same adjustment of heat and speed.

The gas used in the Philadelphia mint is produced from naphtha by an "American oil gas machine," and is, owing to its freedom from sulphur, preferable to any gas made from coal. The machine here described is made by the American Gas Furnace Company, 23 John street, New York.

Letters from Practical Men

Draftsmen and Their Work.

Editor American Machinist:

In your issue No. 16 your esteemed correspondent, Mr. Tecumseh Swift, writes very cleverly upon the art of "Asking Questions," and is insistent about the privilege your readers have in doing so; but with this proviso: that no self-answerable questions be put to your subscribers by any correspondent. What I have to write about is, to myself at least, not self-answerable, and the opinion of Mr. Tecumseh Swift would be highly esteemed by me, upon the following points:

What privilege has a draftsman in regard to placing his name in full, or his initials, upon drawings and tracings that may be made by him? Can there be any good reason advanced for or against placing such upon his work, or is it due entirely to preconceived notions of rights due the profession?

In figuring drawings and tracings, the various systems and manners of execution occupied my thoughts the other day, while looking over the files of the "American Machinist" and other engineering papers. My first experience of drafting was obtained in an Old Country shop, and the chief draftsman was insistent upon the point of making all figures such as contain fractions, thus $2\frac{3}{4}$, of equal hight vertically, and to have the bar dividing the fraction horizontal, as I have shown it, and not as thus 2¾. Most Old Country draftsmen of my acquaintance use the horizontal line. I am told that the reason of its adoption is to make a distinction between fractions of inches and that of

pence, as doubtless you are aware that the oblique line is commonly used in fractions of pence by Old Country bookkeepers and others. In examining the mechanical papers at hand, I find that the "American Machinist" uses both the horizontal and the oblique line, and that the vertical hight of the whole number and the fraction is sometimes equal and sometimes unequal. The practice of that clever draftsman, Reinhardt, varies; what would your reading draftsmen have to say upon this matter? I am in favor of the horizontal line, and having the vertical hight of the characters equal. 'Tis a small matter, perhaps, to many draftsmen; but where you are in charge of a nursery containing a number of bright cubs, experts at blueprinting and mechanical engineering, and who may some day leave the "Lady of the Snows" for Uncle Sam's sunshine, you feel that too much cannot be done to bring them up strictly in the faith; so that in leaving home to enter other drafting rooms they will bring credit at least upon themselves.

The matter of titleing tracings and drawings has always been a source of thought to me. It has been my privilege to see the work of draftsmen from many parts of the world, and I must say that many first-class drafting rooms in the United States put out blueprint copies of their work which do not compare favorably with work from foreign shops. If we could see ourselves as others see us, we would not be so much inclined to believe that we are the whole thing. Now, do *not* take me up as endeavoring to bring disparagement upon the Yankee draftsman's work, because I am of the opinion that in many points he leads to advantage. Many of the changes of late years are due to American drafting rooms, such as the abolition of the use of colors, with their appendages of brush and palette; the standardizing of detail sheets; the adoption of the third angle largely in daily practice; the abandonment of the use of French curves, etc. But why the entire obliteration almost of anything tending to the artistic? I do not argue for a return to the old-time German and Old English letter, but for a standard type of character. Say, adopt a plain block letter of heavy body. It would be of interest to many draftsmen to see copy of the titleing employed in many of the shops in your country.

Another matter of interest, namely, the employment of ladies as tracers: are ladies employed to any extent in this work; do they prove successful, and is the question of salary as frequent upon the *tapis* with them as with the cubs who grow up in the business? That raises the question, What is a tracer's time really worth?

"CANUCK."

[Our correspondent opens a topic that will bear some discussion, which we will not just now attempt to take part in. It may be proper to remark that, while we take some permissible pride in the correctness of our reproductions of shop drawings, and the precision and neatness of the lines, the lettering and figuring do not usually represent shop practice, but are put in as most convenient for the engraver.—Ed.]

A Machine for Measuring Irregular Surfaces.

Editor American Machinist:

While passing through a leather manufactory the other day, the writer came across a machine for measuring irregular areas which attracted his attention, both on account of its simplicity and its adaptation of the familiar method of measuring these areas when one does not possess a planimeter, *i. e.*, by ordinates. The machine in question was used in measuring sides of lace leather which, as is well known, are sold by the square foot. Until the advent of this machine the hides were measured by placing over them, one at a time, a frame divided into foot squares, counting the full squares and estimating the incomplete ones. This in the hands of an expert, was sufficiently accurate, but slow. A large planimeter might have been used, but this method also would have been open to the same objection.

The machine consists of a table about 4 feet wide, with an opening in the center, in which rotates a feeding cylinder *A*, Fig. 1, driven by power. Upon this there rests a series of narrow cast-iron wheels *B*, about 10 inches in diameter, side by side, at about 1 inch intervals, free to be rotated by the cylinder, and also free to lift to allow the hides to be passed between them and the roller. Each wheel carries at its hub a small pinion *C*, about ½ inch in diameter. Referring to the sketch of end of machine, in which all framing is omitted, we have a toothed segment *D* suspended above the pinion and engaged by it only when the wheel is lifted by the passage of material beneath it. The segment is shown in its normal position, held against the stop *K* by the tension of the chain *G* wound about the axle. A pawl is seen at *E*. The upper ends of the chains are fastened to the system of compound levers shown in Fig. 2. The last lever of the system is connected to a retractile spring, which in extending rotates a hand on a dial. The real system is much more complicated than shown, on account of the closeness together of the wheels and their number—about forty. On passing a side of leather through the machine those wheels which come in contact with it are lifted, while still rotating, engaging the pinions with the segments, which, swinging upon their axes, pull down on the chains. When the further edge of the side is reached the wheels drop, releasing the pinions from the segments, which are prevented from swinging back by the pawls. When the reading of the dial has been taken the pawls are released together by a simple movement. The distance each wheel traveled across the hide is thus proportional to the amount of chain wound up, the total amount of chain wound up being added by the lever system. The angle through which the dial pointer is turned is therefore proportional to the distances traveled by the acting wheels. The machine simply adds together a number of ordinates stretching across the side and, as the distance between the wheel is constant, the area is proportional to this length. Of course, there is some error caused by ordinates of unusual length, etc., when the side is of very irregular outline, but these

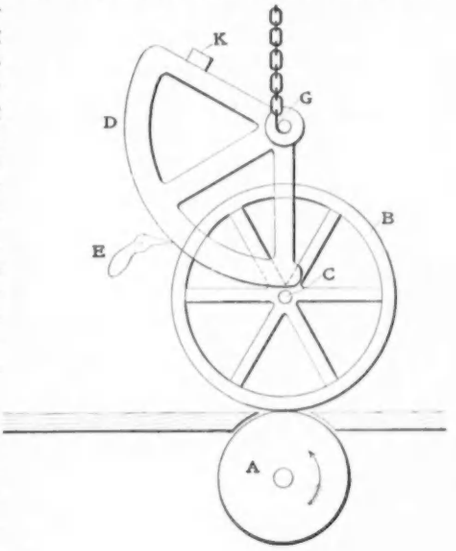


Fig. 1

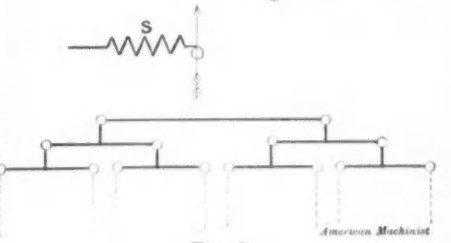


Fig. 2

A MACHINE FOR MEASURING IRREGULAR SURFACES.

errors decrease with the spacing of the wheels, and for the purpose at hand the error is less than 1 per cent. in all but a few cases. A modification of this lever addition principle is often used in computing machines.

BOSTON.

Some Shop Notes.

Editor American Machinist:

The attached sketches are the results of a recent visit to the new shops of the George A. Gray Company and the Cincinnati Milling Machine Company, at Cincinnati. Figs. 1 and 2 are common to both shops. Fig. 1, a chip pan, which explains itself, is a factor in the marked cleanliness of the floors, the cuttings be-

ing removed at stated times or as required. These chip pans are made to stand sufficiently high from the floor, thus catching and preventing the sharp cuttings from getting about the feet of the operator. Fig. 2 shows an elevating and tilting table. As readily seen, it will accommodate the various hights of workmen, and present the work under the operations of filing, scraping and spotting to the best light. These are made in various forms adapted to the work required of them.

Figs. 3, 4 and 5 are from the George A. Gray Company Planer Works. Fig. 3 is a work rack, generally used at the machines and for the fitters, and also in the stock room. The racks are made in hights to suit requirements, and with from two arms, as drawn, for shop use, to ten or twelve, for stock, steel, etc., in the storeroom. The rack consists of simply a cast-iron bracket attached at any suitable hight or hights to a gas pipe column with flange base. When used for finished work, the brackets have wood facings, on which the work rests.

Fig. 4 shows a work bench, with an idea for the drawer. The drawer in this case is a casting in one piece, and, in place of the usual slides under it on each side, it is nicely balanced on the pivot rod in the step bearing, opening and closing with the nicest ease. It can be applied either for right or left hand.

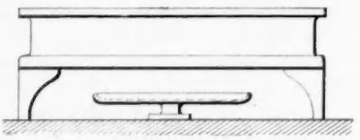


Fig 1

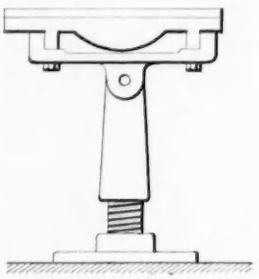


Fig. 2

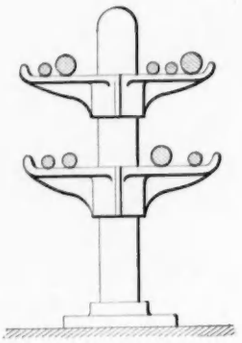


Fig. 3

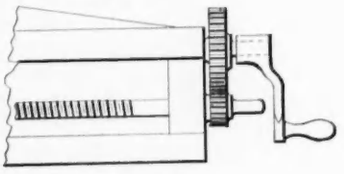


Fig. 7

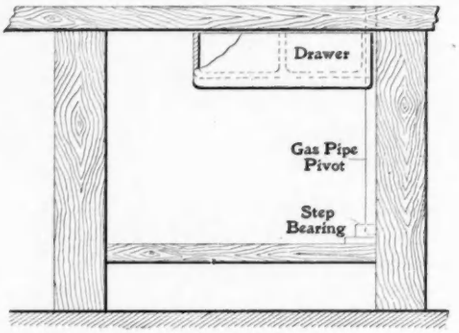


Fig. 4

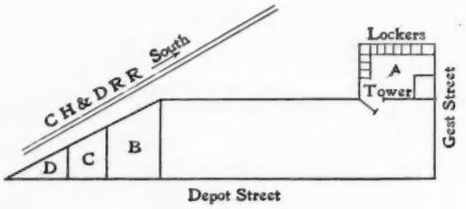


Fig. 5

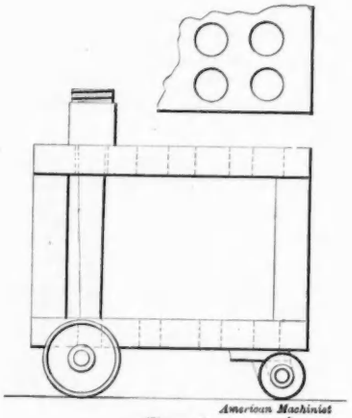


Fig. 6

SOME SHOP CONVENIENCES.

Fig. 5 shows a general plan view of one of three floors of the George A. Gray Planer Works. The commodious tower *A* is in reality an annex to the main building, and in it on each floor have been placed the conveniences for the employees —clothing lockers, washing facilities and the water closets. This tower also contains the elevator and the main stairway.

Conditions of location give the wedge shape to the north end of the building, which has been conveniently utilized. *B* is the drawing office, *C* the blueprint room and *D* the dark room. Fortunately, the conditions referred to will also prevent any shutting out of the good light at *B* and *C*.

Mr. Richter, in charge of the drawing office, is doing very successful experimental work in blueprinting by means of an arc light. The general offices are directly under *B, C, D*. They are well lighted, and, with their modern equipment, present a thoroughly businesslike appearance. Their scrap book, a large invoice book into which has been placed the record of the life of the works, was very interesting, containing early day cuts and catalogs, photographs, advertisements in home and foreign papers and mention of their machines at the various expositions. An old (1866) Niles Tool Works catalog, with the name of George A. Gray as superintendent on its front cover, has been unearthed from among Mr. Gray's effects and filed in this book. Its cuts of lathes and planers look quite ancient when compared to the modern types.

The Cincinnati Milling Machine Company has, in its manufacturing enterprise, introduced many interesting features, in some of which it reminds us of the Cash Register Company, of Dayton, Ohio. Fig. 6 shows its combination truck and work rack in general use, which is made in various sizes to suit the work, from the spindle as shown to the small studs, feed screws, etc. As all running parts are accurately finished by grinding, they, in this way, protect the pieces from the unavoidable scratches usual with other methods of handling.

To insure all operations being accurately made on the spindles, special centers are provided for each at the first operation, and these are not removed until the last is performed. Automatic screw machine work of the largest character is successfully performed on many of the parts, feed bevels, etc.

Premiums for suggestions are paid to employees. Passing through the works, my attention was directed to "that man received the first prize last year, receiving at Christmas time, and quite unexpectedly, the sum of $50 in gold," which, I should think, was a very pleasant surprise to him and his famliy. Of course, many suggestions received are of little value, but prizes to the extent of several hundred dollars are paid out each year. In addition to the usual plan of autograph machines at various points about the works, the men are provided with pads for home use in making their suggestions, avoiding the publicity of being seen making a suggestion.

Fig. 7 was a $10 prize winner last year, the suggestion coming from the man operating the radial drill. The sketch explains itself, and we can readily see the number of turns it must save in a day's work. In this case the man was pleased as much in having the convenience as in receiving the prize.

The comfort of the men has been well

planned. There are two dining rooms, a large one where soup and coffee are served, adding warmth to an otherwise cold lunch, and a smaller one, where the office men and foremen are served a regular meal. There is also a large well-furnished reading room, having in it comfortable chairs and library tables—not of a cheap, good-enough type. Modernly equipped shower baths, the only satisfactory way of taking a bath, are provided and much used by the 300 employees.

In place of the usual cotton waste they use white cloths, for which certain claims are made. These cloths are issued clean every morning, all that are soiled being taken in and put through a washing machine and centrifugal dryer.

A very noticeable feature in connection with the tool check room is the abundance of every small tool that can be required, allowing of no possible delay on the part of the men who are in need of them. Such time, when lost by a less careful system, represents money interest lost that might have been saved had a few more dollars been invested in a greater quantity of these small tools. These tools are replenished, as required, from a large supply on hand in the storeroom. All mandrels are tested on their return, using a machine of great accuracy, and setting aside all that show to be out, a very close limit being adopted.

Finished stock parts are stored away in cupboards with doors to them.

The storeroom stock is complete, even to the duplicate feed belts of the machines. The company uses a lacing machine to do the work usually done by the operator—this as far as possible. All planers run at 36 feet per minute on the cutting speed, and why not, when a good mushet steel tool will stand to 200 feet per minute on a steel shaft in the lathe taking a truing cut? Of course, there are times when a slower speed is required, and for this purpose the Reeves variable countershafts are applied. The double countershaft arrangement allows of the constant speed for the return stroke, the variable speed affecting only the cutting or forward motion. This method of planer work is very interesting, and must eventually come into general practice, superseding the present speeds of 22 feet on small to 17 feet per minute on large planers. Of course, there are times when a planer has all it can do to pull the heavy cuts at the low speeds, but, from my own experience at the machine, I would advocate the use of a variable countershaft, knowing that there are many occasions for its use even to 36 or 40 feet per minute.

Regarding the fitters or benchmen and their work, assembly trucks are used for transferring from storeroom to the general assembling room all necessary parts for a given number of machines, and all parts are there carefully washed in kerosene to remove any possible grit and its usual resultant to the purchasing party.

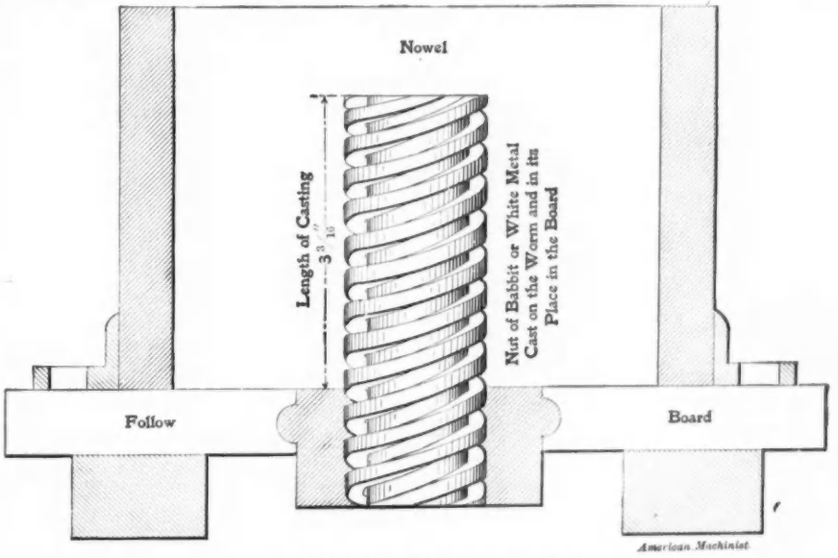
The employees, without the incentive of piece work, are aiding their employers in their purpose of producing the best that is possible in their line of machine tools, and are receiving their just recognition of services rendered in the increase of wages and the special premiums paid them. As shown in many features other than as given here, they are manufacturers, where many shops are operating as builders.

Hamilton, Ohio. WM. PILTON.

Casting a Double-Thread Worm.

Editor American Machinist:

Some time since a sketch was published, with a description of a method followed in molding a double-threaded worm with a pattern separated longitudinally. In that case it was found that upon drawing the pattern from the sand, the tendency was for the pattern to travel endwise. In order to draw the pattern a block of wood was rammed up at the end of each half of the pattern, and by drawing out the block first a space was left, so when the half pattern was gently tipped, bringing the joint face upright, the pattern had traveled some 1¼ inches into the space left by drawing out the block, and when the half pattern was so elevated it would come out easily.



CASTING WORMS FROM SOLID PATTERN.

I enclose a sketch showing a method of molding a double-threaded worm to be cast vertically, and, of course, without joint seams. There is but one pattern, with nut, here sketched to show the method, but in actual use there were four patterns in a flask. Nothing could produce better results than the method followed, as the castings can testify. There was a treatment given these patterns at each molding that seemed to be somewhat singular. They were of iron, and the most successful way to clean and prepare them was to oil them well with crude petroleum, then wipe perfectly clean and dry with clean waste. Kerosene oil, beeswax and other devices were diligently tried, but the first mentioned method was most successful.

The work of molding was very carefully done, fine sand being evenly and not too firmly tucked around the patterns, so that the threads would not be too hard or uneven in firmness. The nowel was cautiously and evenly rammed up with rammers, stricken off and the bottom board carefully rubbed on. Then the nowel was turned over. A wire, so bent as to fit into two holes drilled into the top end of each pattern, was then inserted and the patterns steadily unscrewed out of the nuts, and when all were unscrewed and the follow board removed, the nowel was placed in position upon the floor for pouring. Then the cope was rammed upon a true, plain-surfaced board, with spots showing where the patterns were located to enable the molder to place his pouring gates in right position. They were gated sometimes with horn gates and one center pouring gate, and some were poured with single gates punched through the cope right on top. The cope when finished was closed on to the nowel. There was no fault to be found with the castings.

L. C. JEWETT.

Chills for the Ends of Steam Cylinders.

Editor American Machinist:

In your issue No. 21 (June 9, English edition) I notice an article entitled "Machining a Steam Cylinder." Could the author say what he puts on the chills when casting the cylinders to prevent blowing and make them leave the casting freely?

Belfast, Ireland. "SUBSCRIBER."

Editor American Machinist:

In reference to casting cylinders, using chills to form grooves for packing, my practice is to coat the chill with graphite. Take the dry graphite and coat the surface that the iron is to flow against by

rubbing it over, either with the fingers or a brush. Care should be taken to gate the work so that the current of melted iron will not strike directly upon the chill, and to not have the iron *too* hot. I have used common oil also with good results. There is no trouble about the iron adhering or blowing; or at least I have had none. After the casting is poured and well set the cope should be removed, the casting lifted from the bottom chill, and the end chill also be taken away. This should be done as soon as possible to prevent the shrinkage from holding the chill. If "Subscriber" will again refer to the article he will notice that the ribs on the chill are made with considerable taper or draft. They could, if necessary, give them more than I name. It is, however, *not* necessary.

B. W. T.

Finishing the Edges of Thick Sheet Metal.

Editor American Machinist:

Half-inch square holes were to be punched in sheet machine steel ⅜ inch thick. These holes had to be quite smooth, clean cut, and all exactly of the same size. A drift was used, which was necessarily a slow process, and a method was devised to do them on the power press. A punch was made as per sketch, Fig. 1, with round corners, and forced into the hole, which was .010 inch smaller than the size required. It was found that this form of punch made a beautifully smooth hole, clean-cut and polished like a mirror.

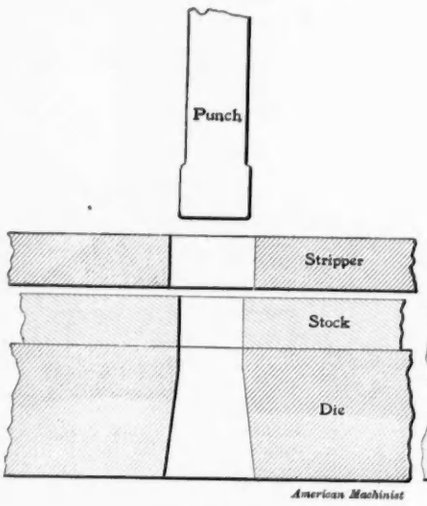


Fig. 1

PUNCHING SMOOTH HOLES.

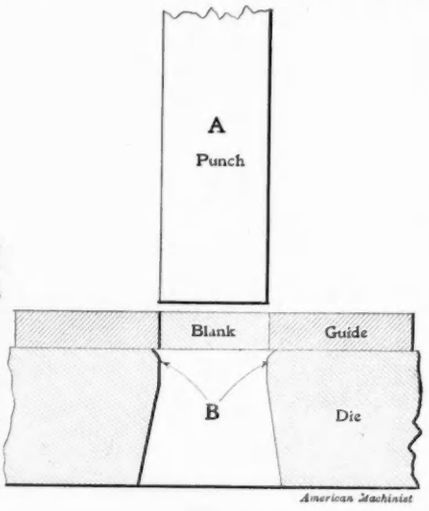


Fig. 2

PUNCHING OUT SMOOTH BLANKS.

The same principle was applied to external work. A die was made like Fig. 2, and punch like *A*, and they were found to work admirably, the edges being clean cut and shining like a mirror, especially on thick sheet copper and Norway iron.

The blank was left about .005 inch larger all over than required. The die at *B* must be highly polished to give good results.

The principle involved in this method is simply the principle of wire drawing, with this difference, that instead of hauling the stock through a die it is pushed through by the punch, which is allowed to go through the die. Many kinds of work can be finished in this manner far more accurately and cheaper than on the milling machine.

JOHN E. CRIGGAL.

New York.

The Demand for Young Men.

Editor American Machinist:

"Wanted—Superintendent; toolmaker preferred; not over thirty-five years of age." The above ad. in a daily paper calls for the following: Why such ads. should appear must be a query hard to answer by many of the craft, especially to those, of course, who have had the misfortune to grow older than thirty-five. Apparently their experience after they had attained the age of thirty-five years is of no value. When they turn over their sketches and memoranda taken since that particular age they will now be aware that they are of no value. In a conversation with an older brother of the craft he gave his experience since he passed the rubicon, thirty-five, as follows: Two years with electrical motor company, two years with typewriter company, one year with sheet-metal concern, one year with rubber-manufacturing concern, two years with bicycle concern, four years in experimental work. Sketches and memoranda taken since that memorable date cover over 100 examples of jigs, dies and fixtures. He claims to have learned more in that time than in all previous years. His eyes are good; physically he is in best of health. Yet, here he is not wanted. What folly is this to draw the line at thirty-five years of age? I have in mind several old-timers, the heads of concerns employing from 400 to 600 hands, whose management is beyond criticism, whose white hair is certainly no mark of mental and mechanical decadence, for the result in their shops is highly satisfactory.

A manufacturing executive is valuable according to his experience and brains, not according to his youth. An executive superintending the construction of a ditch, the erection of telegraph poles, or any other plain, simple work, where a bullying, hustling gang can be employed, may be a man whose age is limited to the years when one is still calculated as a possible candidate for the honors of the fistic arena; but to limit the age of a manufacturing executive desired to thirty-five years certainly does make one wonder just what sort of a "critter" the advertiser is and what sort of a man does he desire to employ.

JOHN G. NIEDERER.

Rear Driving for Automobiles.

Editor American Machinist:

In the "American Machinist," No. 24, Mr. Charles E. Duryea rakes me, as he undoubtedly imagines, very severely over the coals for what I have said in the last of two articles ("American Machinist," Nos. 10 and 18) on the rear-driving system of automobiles. Mr. Duryea scores a number of points against me—for aught anybody may know who has read his article alone—by falsely attributing to me an attempt at advocating rear steering for automobiles.

Mr. Duryea has evidently failed to understand that one may attack "rear-driving and front-steering" without in the least advocating "front-driving and rear-steering." By a second perusal he will in vain seek for a single word in commendation of rear steering in any of my articles. As a matter of personal fact, I have no more use for rear steering than Mr. Duryea; yet that is the point upon which he directs his onslaught. The trend of my articles is decidedly and plain-spokenly in favor of "front driving and front steering," or in some cases "tractor driving." It could not be expected that I should indicate in a magazine article the exact construction by which I would render "front driving and front steering" practicable. To have done so would have taken me beyond the scope of journalism. In the new industry connected with automobilism persons who can furnish valuable improvements in the tangible form of working drawings or detailed descriptions are entitled to higher compensation than commonly allowed for newspaper work. For the same reason I must refuse to enter into a detailed controversy with Mr. Duryea. His misunderstanding of my reasoning is fundamental. To pick at his words would, under the circumstances, be frivolous.

M. C. KRARUP.

Crank Shafts for Large Engines.

Editor American Machinist:

In the article on "Crank Shafts for Large Engines," issue No. 26, second paragraph, second column, you make me say "that a water-cooled bearing is sure evidence of an insufficient bearing I cannot at all agree," etc. This is a typographical error, which happens to *exactly reverse* my meaning. I said *inefficient*, not *insufficient*. A water-cooled bearing *is*, almost per se, *insufficient*, but is by no means *inefficient*, and the latter statement is what I wished inserted. S. L. G. KNOX.

The Development of a Machinery Industry in Siberia.

Russia is making steady progress in her Asiatic possessions. The Great Siberian Railroad is now completed as far as Irkutsk, on Lake Baikal. Large and rich deposits of bituminous coal have been discovered in many places along the line, and several coal mines are already in working order. It was long ago pointed out that it would be absolutely impossible—in the long run—to import from abroad all the material and tools, etc., which year by year would be required for this immense territory, as the cost of transportation for such long distances would come too high.

As a natural result, the establishment of machine shops has already been started in Siberia. A Russian contemporary says that as much as two years ago a Russian merchant, Mr. Schadrin, built an extensive machine shop and a yard for the construction and repair work of river steamers at Blagowjeschtschensk, on the Amur River, in Eastern Siberia. At the present time—our Russian contemporary states—these works have orders on hand for the construction of six steamers with flat bottoms to be used on the Amur. The steam engines for these boats will be constructed in special shops of the company. The entire plant of Mr. Schadrin is equipped throughout with the most improved and latest machines and tools. All shops are large, well organized, and lighted by electricity. The workmen are chiefly Russians, though a number of Chinese are also employed.

A few months ago a large new establishment was opened at Tomsk, in Western Siberia. The proprietors are Messrs. Sablin, Slotnitzky & Masljukoff. The works of this company are very extensive, and will especially engage in the manufacture of iron and brass castings, forgings, etc. A large machine shop is connected with the works, where all kinds of machinery and boilers will be repaired. The works are at present almost overloaded with orders.

At Tcheliabinsk, the capital of the district of the same name, in the Government of Orenburg, Western Siberia, the Voronesh firm of Stohl & Co. opened machine shops, foundries and boiler shops in 1899. These works will make the manufacture of all kinds of agricultural machinery and implements a specialty. Other machine shops are said to be in course of construction in various parts of Western, Central and Eastern Siberia. In the "American Machinist," No. 23, the establishment of a large foundry at Irkutsk, on Lake Baikal, was mentioned. Other large engineering works in the latter place are those of Messrs. Butin Bros., who are said to employ some 600 men.

These few examples show that a start has been made toward creating a machinery industry in Siberia. No doubt this industry will assume larger proportions as soon as the immense coal and iron deposits of the country are worked on a greater scale. During the construction of the Great Siberian Railway vast deposits of iron of a good quality have been found to occur in many places near the road, so that they can easily be worked.

Under such circumstances the demand for machine tools will grow in Siberia, and American manufacturers should make the necessary efforts to gain a foothold in this market. Siberian industries are well under way. Cities and towns which a few years ago were simple market places where hides, skins, furs and the like products formed the chief articles of trade, and where life was extremely primitive, have so rapidly changed their appearance that an old-time resident would scarcely recognize them. Blagowjeschtschensk, in Eastern Siberia, for instance, was a mere village some years ago. To-day it is the busiest city of Eastern Siberia, and notably enterprising. It has 16 schools, 7 banks, 10 churches, 5,000 houses, 1 match factory, 3 iron foundries, 6 wineries, 3 breweries, 4 sawmills, 3 rope factories, 1 each of potash, glass, mattress and soap factories, a furnace-brick kiln, 12 common brick kilns, 10 tanneries and 3 lime kilns, the annual business of the city amounting to a value of at least $12,000,000. Three thousand merchants have taken out licenses to trade in a 1,000-mile line of the Amur River system, between Khabarowsk and the junction of the Amur and Spilka, of which this city is the center.

In every respect the Russian Government is taking steps towards improving the general condition of Siberia. It was only a few weeks ago that the authorities in St. Petersburg appropriated a large amount for the establishment of four railroad schools in different parts of Siberia.

H. L. G.

American Shipbuilding Activity.

We take pleasure in reproducing the following from the "Blue Book of American Shipping," just issued by the Marine Review Publishing Company, Cleveland, Ohio. It will be seen that at the present time shipbuilding is one of the most prosperous and promising of our industries:

"The development in iron and steel ship building, which was noted in the last issue of the 'Blue Book,' continues with unabated energy. New shipyards are springing up along the Atlantic and Pacific coasts. The New York Ship Building Company is building a new plant at Camden, N. J., which will be one of the largest in the country. Work is being rushed, and the company expects to bid for the n w battleships and cruisers to be built by the United States Navy. Ship construction will be begun there some time during the present year. At New London, Conn., the Eastern Ship Building Company is erecting an immense plant. The works of this company are primarily established to build two cargo carriers for the Pacific trade for James J. Hill, of the Great Northern Railway. These carriers will be of 34,000 tons, and will exceed in size anything afloat. Something of their size may be appreciated when it is said that they will be bigger than the Lucania and Campania put together, and will have about five acres of deck space. As profit-earning capacity and not speed is the end sought, they will be slow boats, designed for moderate coal consumption. The Wm. R. Trigg Company, of Richmond, Va., is adding extensively to its plant, being now engaged in an outlay of $800,000 in improvements. The new equipment will make it one of the largest ship building plants on the Atlantic coast. The Fore River Engine Company, of Weymouth, Mass., one of the latest in the field, has grown so rapidly that it has just purchased sixty acres of land at Quincy Point, Mass., two miles from its present site, for a new plant. The Cramps, at Philadelphia, have extended their works by the purchase of an adjoining shipyard, and the Newport News Company, at Newport News, Va., is just completing a very large dry dock and other additions to its plant. A healthful sign is the appearance of the American 'tramp' steamer, which, nomad though it be, is the sure forerunner of a reviving merchant marine. The New England shipyards, too, are still building a type of very large sailing vessels, one of them a six-masted schooner, the largest that has ever been constructed. In the handling of that class of freight which depends more upon economy of movement than promptness of delivery, these vessels will have a distinct field of usefulness.

"Since the opening of Alaska, the Pacific coast has received a decided impetus in ship building. The Risdon Iron Works, of San Francisco, have engaged in general ship building. They are equipping a plant of sufficient capacity to build the largest type of ships. The Wolff & Zwicker Iron Works, of Portland, Ore., are contemplating the erection of a ship building plant at St. John's. At the Union Iron Works, San Francisco, additions and improvements of considerable importance have been made of late, and the same is true in a proportionate degree of the smaller works. The development of trade with

the Orient will make the Pacific coast an important center in ship building. Of that there are sufficient signs already.

"The approximate value of vessels built in ship yards of the great lakes during the past year is $10,500,000. Nearly all of these vessels are steel freight steamers of 450 to 500 feet in length and of 7,000 to 8,000 net tons capacity, equipped with quadruple expansion engines of 1,800 to 3,000 horse-power, and in most cases with water-tube boilers. The year has, of course, been one of the most prosperous in the history of lake ship building, on account of the boom in iron and steel lines. There are still a large number of ships under construction in the lake yards, some of them not to come out until the spring of 1901, and there is every reason to expect, in view of the profits assured to ship owners by reason of contracts made last fall, a renewal of orders that will give the yards nearly as much work for another winter as they have had in the past year. If the number of new ships ordered for lake trade should be limited, the difference will probably be made up in steel freight steamers of about 3,000 tons capacity to be built for both lake and Atlantic service—vessels suited to passage through the Canadian canals from the lakes to the seaboard. The canal type of steamer is about 255 feet over all, 42 feet beam and 26 feet molded depth. About a dozen such vessels are now in commission on the lakes, and they might be sent on to the seaboard for coast service at any time. The few that have gone to the Atlantic have proven so successful in the trade to Porto Rico and down the United States coast that it is proposed to equip four others, now under construction at the works of the American Ship Building Company, for all kinds of service on salt water as well as on the lakes. Companies are forming for the construction and operation of a very large fleet of steamers of this kind, and it is expected that the lake builders will profit largely on this score."

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant ; see p. 22.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

Punches & dies. Wal.M.Wks.,Waltham,Mass.

Dies & punches. Amer. Hdw. Co., Ottawa, Ill.

Grinder for sharpening punches and dies. Delivouk & George, Chicago.

Light and fine mach'y to order ; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas,Bridgeport,Ct. Send for index sheet.

F. J. Stokes Machine Co., 13th and Noble sts., Philadelphia, Pa., build light machinery.

"Brandt's Triple Expansion Gaskets" are the best for boilers. Randolph Brandt, 38 Cortlandt st., New York.

Patents obtained ; American, foreign ; long experience ; low charges. Edwin Guthrie, Registered Solicitor, Washington, D. C.

Wanted—Parties with facilities to manufacture medium and heavy high-grade machinery. Address "Phila.," care AM. MACH.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

A well-equipped machine shop and foundry, with ample water power, capacity 50 mechanics, tools suitable for engine building up to 24 x 24-inch or similar work, invites proposals in their line, or will consider manufacturing new specialties. Address P. O. Drawer 414, Lockport, N. Y.

Wants.

Situation and Help Advertisements only-inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded ; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Draftsman on gas-engine work wishes to change. Box 140, AMERICAN MACHINIST.

Draftsman, 4 years' experience, technical graduate, wants position. Box 141, AM. M.

Experienced foundry foreman open for engagement ; A1 references. H. G., AM. MACH.

Situation wanted by experienced machine draftsman, as tracer and detailer. Box 150, AMERICAN MACHINIST.

Experienced grinder would like position in charge of grinding department ; 5 years in charge present job. Box 145, AMER. MACH.

A young man who has had 18 months' experience in the drawing room upon machine-tool work, would like a similar position. Box 142, AMERICAN MACHINIST.

A thorough mechanic with technical education and experience as designing draftsman, wants position as assistant superintendent or foreman. Box 151, AMERICAN MACHINIST.

Wanted—Situation as foreman machinist, by one having a broad experience with engines, governors, pumps, piping, dynamos and general repairing. "Indicator," care AM. M.

Wanted—Position as general foreman or assistant superintendent ; can handle men successfully ; up in modern methods and interchangeable work. Box 144, AMER. MACH.

Designer and draftsman, steam engines, air compressors and kindred work, wants permanent job ; manufacturing system ; details foundry, machine and pattern shops ; costs ; can take charge. D-142, care AMER. MACH.

Designer automatic machinery, inventive ability, 8 years' experience intricate designing and supervising shop work, technical graduate '92, desires position to work up inventions or as head draftsman ; N. Y. City preferred. Box 109, AMERICAN MACHINIST.

Wanted—By a practical mechanic, a position as manager of a factory consisting of foundry, machine shop, etc. ; thorough practical knowledge of up-to-date methods in general manufacturing ; extensive experience as an expert in modern factory organization. Box 143, AMERICAN MACHINIST.

Specialist in gasoline engines desires to change ; responsible position on marine work preferred ; has successfully designed both 4-cycle and 2-cycle engines, and is thoroughly familiar with the requirements of high-grade launch motors ; strictly practical. "Gasoline," care AMERICAN MACHINIST.

Position as traveling salesman ; 15 years' experience ; 6 years with present concern ; would fit into any mechanical line ; accustomed to closing large contracts ; can earn salary or quit ; salary $3,000 and expenses ; can sell anything that's good ; don't want to sell anything else. Box 120, AMER. MACH.

Help Wanted.

Draftsman wanted, accustomed to general machine work ; give experience and references. Box 146, AMERICAN MACHINIST.

Draftsmen desiring extra money, state where employed, confidential. Edwin Guthrie, Corcoran Building, Washington, D. C.

Foreman patternmaker for a medium-size engine and general shop ; references required. Address "Active," care AMER. MACHINIST.

Wanted—An experienced toolmaker on tools for brass and iron work ; state age, experience and wages expected. Box 147, A. MACH.

Wanted—First-class iron foundry foreman, experienced on valve and hydrant work ; state age, experience and wages expected. Box 139, AMERICAN MACHINIST.

Machinist contractor wanted to handle about 75 men ; one acquainted with steam, oil and gas engines preferred. T. M. D., AMERICAN MACHINIST.

Wanted—A draftsman, experienced on water-works valves and hydrants. Write, stating age, experience and salary expected, Box 148, AMERICAN MACHINIST.

Foundry foreman ; one who can take charge of 150 men and produce results ; state experience, salary wanted and age. Address "Ohio," care AMERICAN MACHINIST.

Master mechanic for rolling mill ; must be a worker, able to handle men, sober and reliable, and thoroughly understand Corliss engines. "Rolling Mill," care AMER. MACH.

Wanted, at Once—Foreman of wide experience for machine shop producing large direct-current dynamos and motors ; good salary for the proper person. Box 78, AMER. MACH.

Expert layer-out for boiler shop ; one accustomed to laying out intricate work from blueprints. Address, giving age, experience and salary expected, L. O., care AM. MACH.

Wanted—A few first-class machine hands for vertical or horizontal boring machine and large lathe, for up-to-date shop in western New York. Address Box 137, AMER. MACH.

General machine-shop foreman ; a good place for a good man familiar with Corliss engine and similar machinery ; give experience and salary. Address Fulton, care AM. MACH.

Competent man wanted to take charge of shop and design special tools ; technical education and experience on textile or sewing machinery desirable. Box 135, AMER. MACH.

Wanted, at Once—Foreman of wide experience for winding department of factory producing large direct-current dynamos and motors ; good salary for the proper person. Box 79, AMERICAN MACHINIST.

Wanted—A thorough, competent and experienced young man to take charge of our engine department. Address, stating full name, age, experience and references, Buffalo Forge Company, Buffalo, N. Y.

Foundry foreman wanted ; an experienced, reliable man for green sand, dry sand and loam castings, for engines and general work ; give references and full particulars. Address A. B. C., care AMERICAN MACHINIST.

Foreman toolmaker ; New England shop employing 250 men, including 6 to 10 toolmakers ; manufacturing engines and machinery ; give experience, references and pay expected. Box 97, AMERICAN MACHINIST.

First-class mechanical draftsman wanted in New York City ; must be familiar with light automatic machinery ; good opening for good man. Address letters, stating particulars in full, to Box 131, AMERICAN MACHINIST.

Wanted—Man to take charge of die department, who is experienced in handling men and in the construction of sheet metal working dies, by a concern in large town in western New York. Address "Folsom," care AM. M.

Wanted—In a Philadelphia establishment, a thoroughly experienced designer and draftsman on heavy Corliss engines and flywheel pumping engines ; state experience, age and expected salary. Address H. J., care AM. M.

We are enlarging our works, and will shortly require an increased number of skilled mechanics ; we invite application from pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Energetic, capable manager, with view of becoming president of established, prosperous concern manufacturing dies, reamers, punches, machine tools and brass specialties. Apply by letter only, stating references and experience, Box 149, AMERICAN MACHINIST.

Foreman boiler maker, by a shop employing about 150 men ; man must have complete knowledge of all details, and be able to handle men to good advantage ; good salary to right man. Give age, reference and salary expected to F. B. M., care AMER. MACHINIST.

We can use on heavy boring machines, planers and large lathes several first-class machinists who can and will make these machines do all they were designed to do ; unless you can earn 30 or more cents per hour do not apply. Gates Iron Works, 650 Elston ave., Chicago.

Wanted—A strictly first-class machinist thoroughly familiar with the operating of Gisholt lathes, and also capable of designing tools for same ; a man of good education preferred ; none but strictly first-class men need apply. Address, stating particulars, age, etc., Box 138, AMERICAN MACHINIST.

Wanted—First-class toolmakers on small tool and model work for factory in western

(Continued on page 47.)

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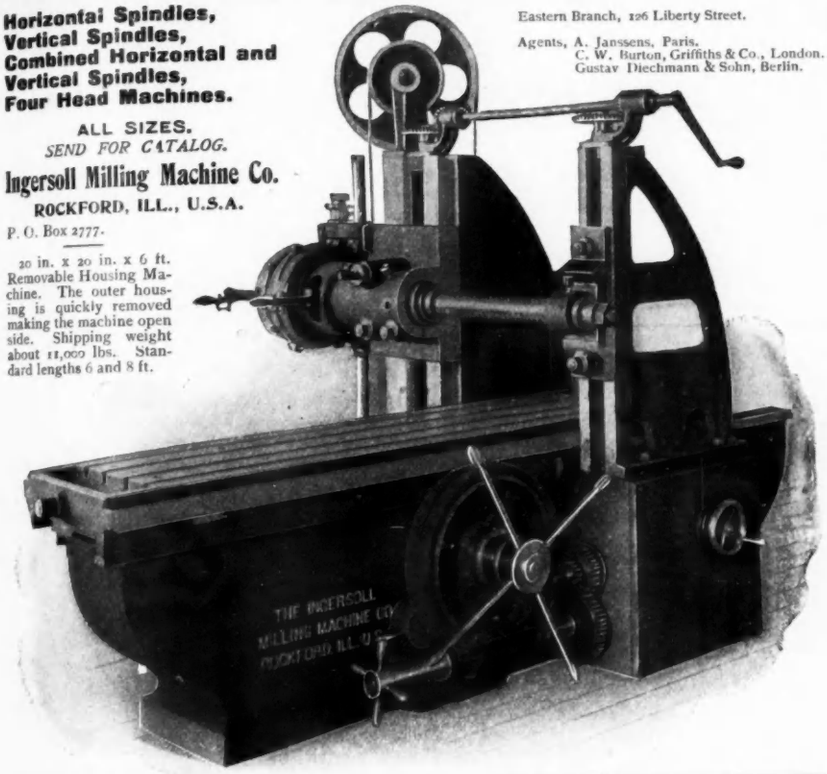

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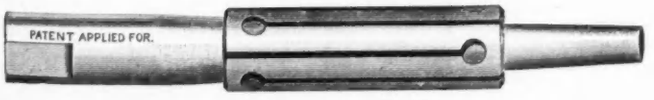

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Help Wanted—Continued.

New England; permanent positions for first-class men; to receive consideration, applicants must state work most familiar with, place of last employment and wages expected. Reply Box 115, AMERICAN MACHINIST.

Wanted—Foreman for machine shop building steam pumps and ice machines; applicant must be a first-class mechanic, well up in modern machine-shop practice and know how to handle men. In replying give age, present position and mechanical experience; all answers confidential. Box 117, AM. M.

Wanted—An experienced machinist as foreman in a general repair shop; work mostly on engines and pumps, some new work, requiring thorough familiarity with modern tools and ability to devise special methods for expediting work; an excellent situation with good wages to an energetic man. Address F., P. O. Box 2,762, New York.

Mechanical engineer who has had experience in the construction department of a steel mill is wanted to organize and conduct a construction department in a well-established business of magnitude; applicant should give full particulars as to age and detailed experience; to the proper man this is an exceptional opportunity. Address B. M., care A. MACH.

General foreman for machine shop in city of Western N. Y., employing about 100 hands; energetic man with thorough knowledge of modern shop practice, strict disciplinarian, who can devise methods to expedite the work and organize the force to obtain best results; steady position with responsible firm; please state experience, etc. Address "Light Machinery," care AMERICAN MACHINIST.

Wanted—Foreman for toolroom in machine shop located in Western Pennsylvania, employing 125 men on high-grade gas and steam engine work; must be capable of designing jigs and tools for economical, rapid and accurate work, where all parts are made interchangeable; state age, experience and salary desired; references required. Address "Improvement," care AMERICAN MACHINIST.

Wanted—A first-class, practical superintendent for a large machine manufacturing establishment; must have extensive experience in all branches of the business and be fully capable of handling a large number of men; the position is a responsible one, and none but persons of recognized ability will be considered; applications must state age, reference, past experience in detail and salary expected. Box 136, AMERICAN MACHINIST.

New Catalogs.

The Storage Power Company, 30 Broad street, New York, sends us a pamphlet descriptive of the Prall system of power storage, especially for railway purposes, by superheated water. Size, 10x6¾ inches.

The S. Obermayer Company, Cincinnati, O., has published a 234-page catalog of foundry supplies. It contains about everything required in a modern foundry for melting and handling metal of all kinds. Among the lines to which attention is devoted are molding machines of various makes, cupolas, tumbling mills, cranes, ladles and foundry facings. Size, standard, 6x9 inches.

Manufacturers.

The Victoria Foundry Company, Ottawa, Ont., expects to put up a new building.

Contractor M. A. McKnight, Beaumont, Tex., is constructing the Jahn rice mill at that place.

The Vincent Valve Company, Owosso, Mich., has just received bids to erect a factory and office building.

The Adams Company is preparing to erect an addition to its foundry near the foot of Third street, Dubuque, Ia.

A permit has been issued for a $34,000 addition to the Westinghouse foundry on Robinson street, Pittsburgh, Pa.

A permit has been taken out for a $30,000 addition to a factory of A. Turner, 572-580 South Morgan street, Chicago, Ill.

A new textile mill, the Glendale, will be erected in Easthampton, Mass. Contractor C. W. Smith has the matter in hand.

Work is just beginning on an addition to the Dunn Worsted Mills, Woonsocket, R. I. Joseph Gilman & Co. have the contract.

The Princeton (Ind.) Light & Power Company has increased its capital stock to $75,000, and the plant will be enlarged and improved.

The Gold Spring Bleaching & Finishing Company, with a capital of $100,000, will erect, on a 20-acre tract at Yardley, Bucks County, Pa., a building 150 by 300 feet.

The Reading Industrial Works, 141-143 Cedar streets, Reading, Pa., manufacturers of laces, embroideries and handkerchiefs, will erect a 36x100-foot three-story factory at that place.

A contract for the erection of the Bibb Manufacturing Company's new cotton mill at Columbus, Ga., has been let to J. R. Smiling & Co., of Macon. The mill will have 20,000 spindles.

The Ottawa Investment Company, Ottawa, Ont., has taken out a permit for a $10,000 brick and stone foundry and machine shop on Middle street. This is the site of the old Victoria foundry.

James Griffith & Sons, Cincinnati, O., have secured a building permit for the erection of a $30,000 factory building at Seventh and North streets for the Krippendorf-Dittman Company, shoe manufacturers.

Kraus Bros. have filed with the Department of Buildings of the Borough of Queens plans for a wall-paper pattern factory, 25 feet by 100 feet, on Eleventh avenue, near Jamaica avenue, Long Island City, N. Y.

Contractors William Steele & Sons, Philadelphia, Pa., have plans and specifications for a proposed seven-story brick store and factory building, 28x200 feet, at No. 837 Market street, for John Dobson, dry goods manufacturer.

Plans and specifications for a factory building for the Raymond Button Company, Baltimore, Md., have been put out among builders for estimates. It will be located at Mount and Cole streets, and will occupy a lot about 50x100 feet.

The two lumber mills at Shirley, Ind., belonging to Kuntz Bros.' Lumber Company and C. P. Kuntz & Co., were destroyed by fire June 19. The total loss is estimated at $40,000. Both firms had large stocks on hand. The two mills will be rebuilt at once.

A permit has been issued by the fire marshall, New Haven, Conn., to the Winchester Repeating Arms Company for an $8,000 structure, to be used for an independent gas plant. It will be two stories high, 34x94 feet, with a 29x32-foot wing.

Julius Breckwoldt & Co., proprietors of the sounding board factory, which was recently destroyed by fire at Dolgeville, N. Y., have decided to remain at Dolgeville, and the Giese factory will be remodeled for use. The concern employs about 100 men.

The Athens Cotton Mill Company, Athens, Ga., has purchased a 13-acre tract just north of town, as a site for its factory. The buildings will be begun as soon as the plans are received from the architect, and will be pushed rapidly until ready for the machinery.

At the annual meeting of the Minnesota Elevator Company, which has its head offices in Winona, Minn., it was decided to erect several more elevators on the new extensions of the Chicago & Northwestern road in Minnesota and Iowa. The old officers were re-elected.

The Marsden Cellulose Company, which is engaged in the construction of a large factory at South Bartonville, Ill., is figuring on the construction of a branch plant at San Jose. The factory is to cost in the neighbor-

(*Continued on page* 49.)

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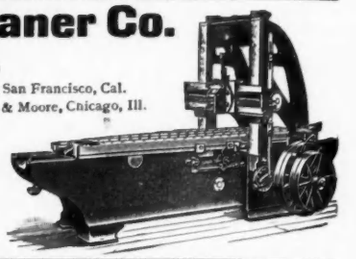

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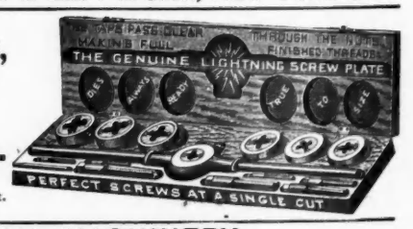

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